

NORPLEX

IACMI Consortium Project Update

Natural-Fiber Thermoplastic Composite Manufacturing

Dustin Davis

Director of Sales and Business Development

ddavis@norplex.com



August 2023

Introduction

Norplex

1900's
Norplex begins manufacturing operations in La Crosse, WI

1950's
Norplex begins production of copper clad circuit boards

1960's
Norplex opens Postville, IA facility for industrial laminate production

1975
Allied Signal acquires Norplex

1988
Allied Signal acquires Norplex

1996
IDI acquires Norplex – Postville, IA

Micarta

1900's
Leo Baekeland discovers phenolic resins - Westinghouse begins producing industrial laminates

1950's
Westinghouse moves laminate production to Hampton, SC

1960's
Westinghouse begins production of copper clad circuit boards

1975
Westinghouse begins production of copper clad circuit boards

1988
Westinghouse begins production of copper clad circuit boards

1995
International Paper acquires Micarta from Westinghouse

1996
International Paper acquires Micarta from Westinghouse

2002
Nevamar acquires Micarta and segregates the business into decorative and industrial laminates

2003

Norplex acquires Micarta and
Norplex-Micarta is Formed

2013

Norplex-Micarta expands in Asia and
China Facility Begins Production

2018

Iowa Facility Expanded:
Added Filament Winding Capabilities



Micarta's first product was built
on natural fibers in the 1900s

NORPLEX

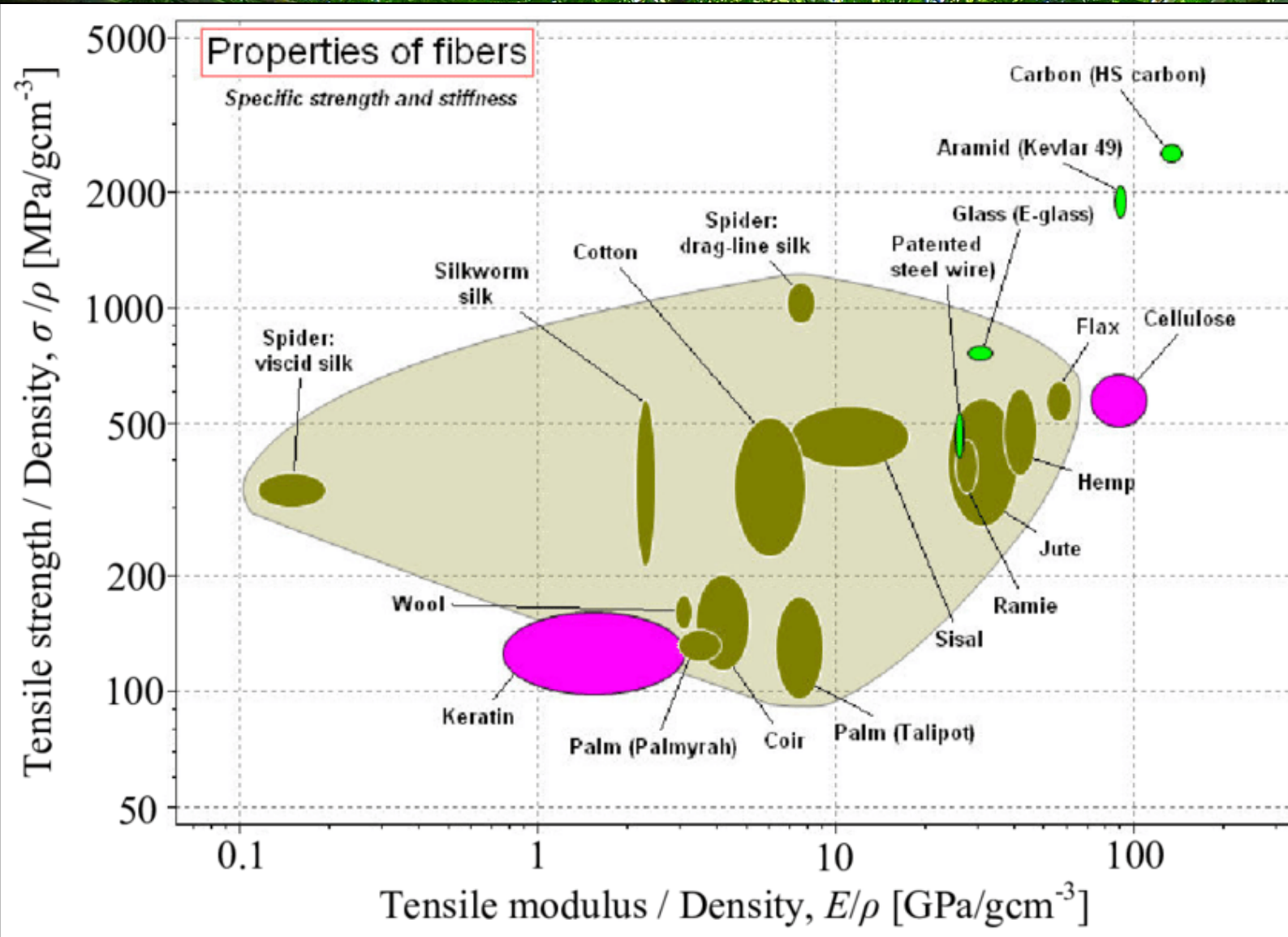
History of Natural Fiber Composites

- Natural Fibers are not new to the composites industry
- One of the original materials, natural fiber composites still commonly used in a range of industrial applications because:
 - 1) low cost
 - 2) lightweight
 - 3) electrical and thermal insulation
 - 4) wear properties
- Common reinforcements are paper, canvas, linen
- Less common: Jute, Flax
- Resin systems today are generally thermoset – phenolic or epoxy

These materials are also used because of their interesting aesthetics – and the fact they are insulators so they are always “warm” to the touch!



Natural Fiber Composites Mechanical Properties



Ashby plot comparing the position of natural fibers against synthetic fibers with respect to specific tensile properties.

Shah DU. Journal of Materials Science (2013). 48 (18): p. 6083-6107.
<http://dx.doi.org/10.1007/s10853-013-7458-7>

Developing plant fiber composites for structural applications by optimizing composite parameters: a critical review.

NORPLEX

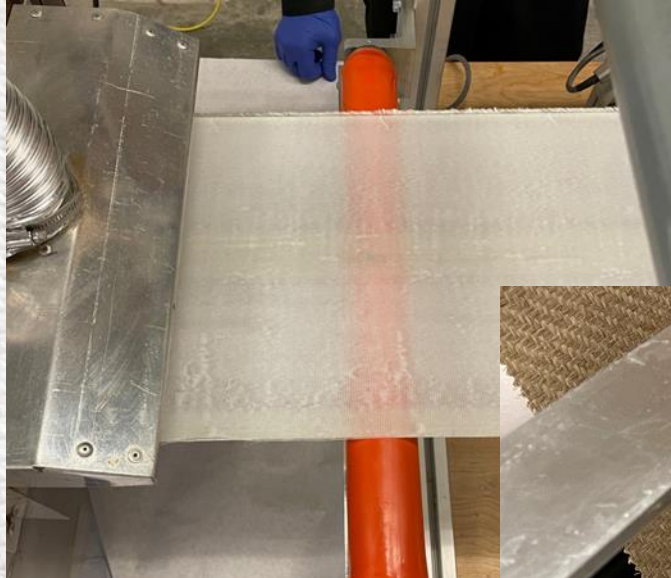
Current Work

NORPLEX

ARKEMA



Objective: demonstrate feasibility of impregnating natural fibers with Elium resin in a continuous process



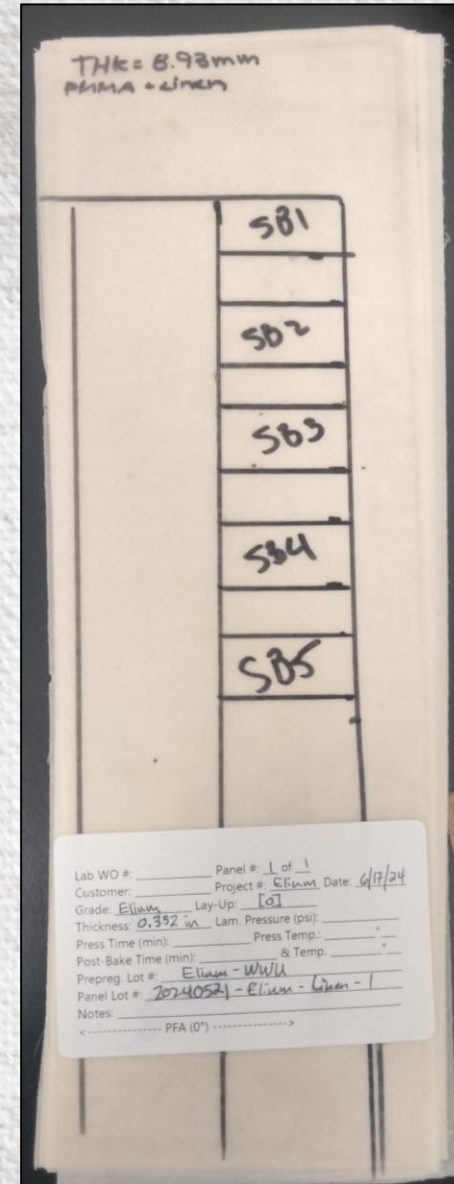
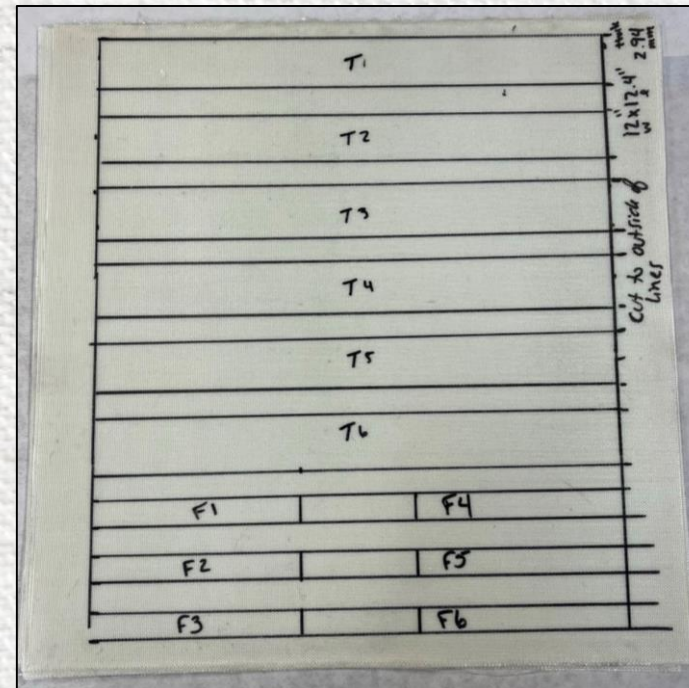
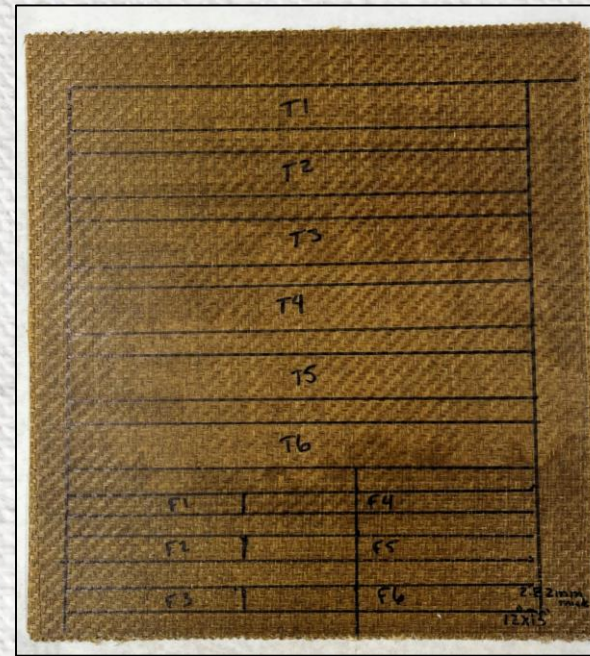
Laminate Consolidation

Test panels were pressed at 350°F, 145 psi, 20 minutes.

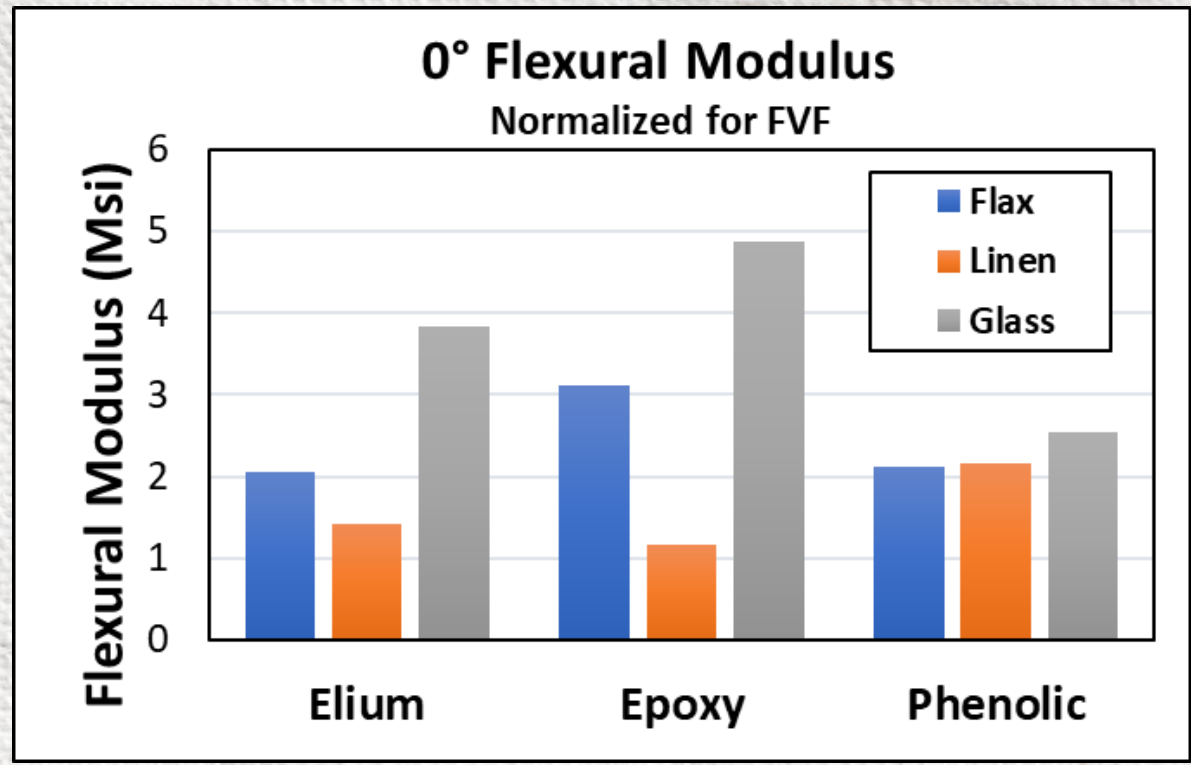
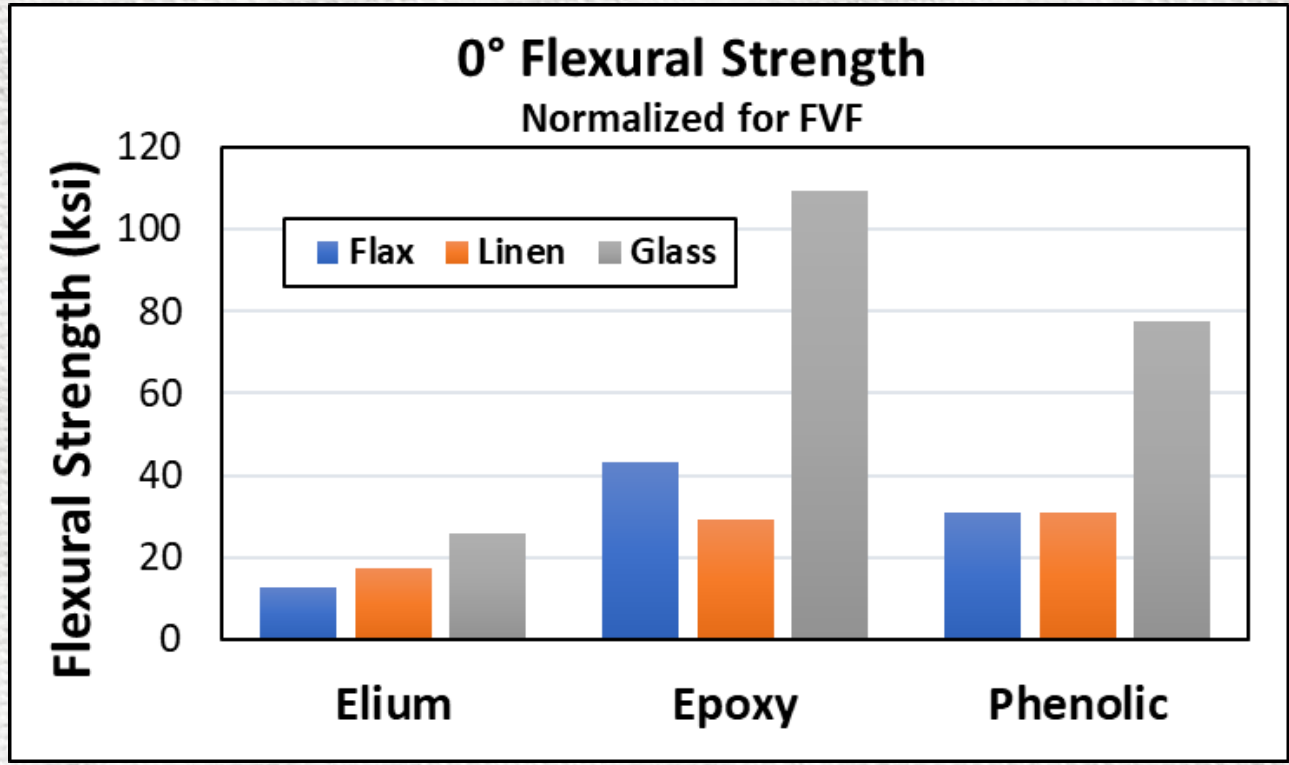


Can be pressed into curved shapes!

Rolled onto cores!

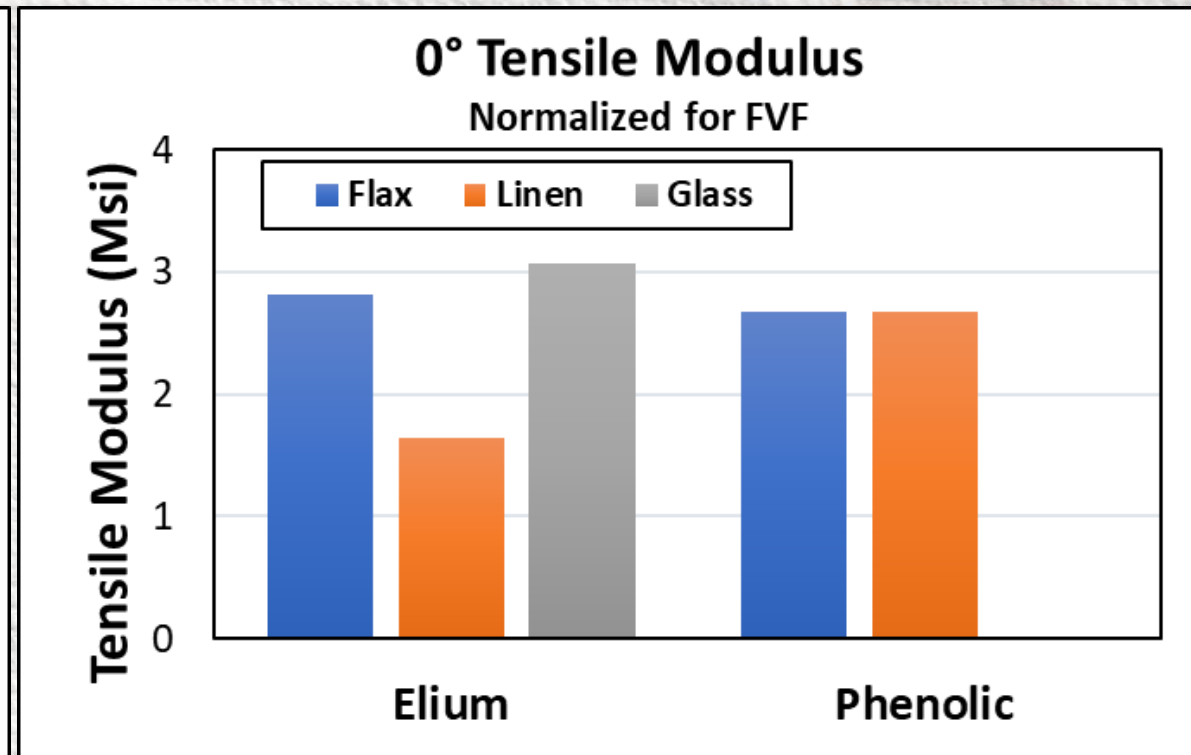
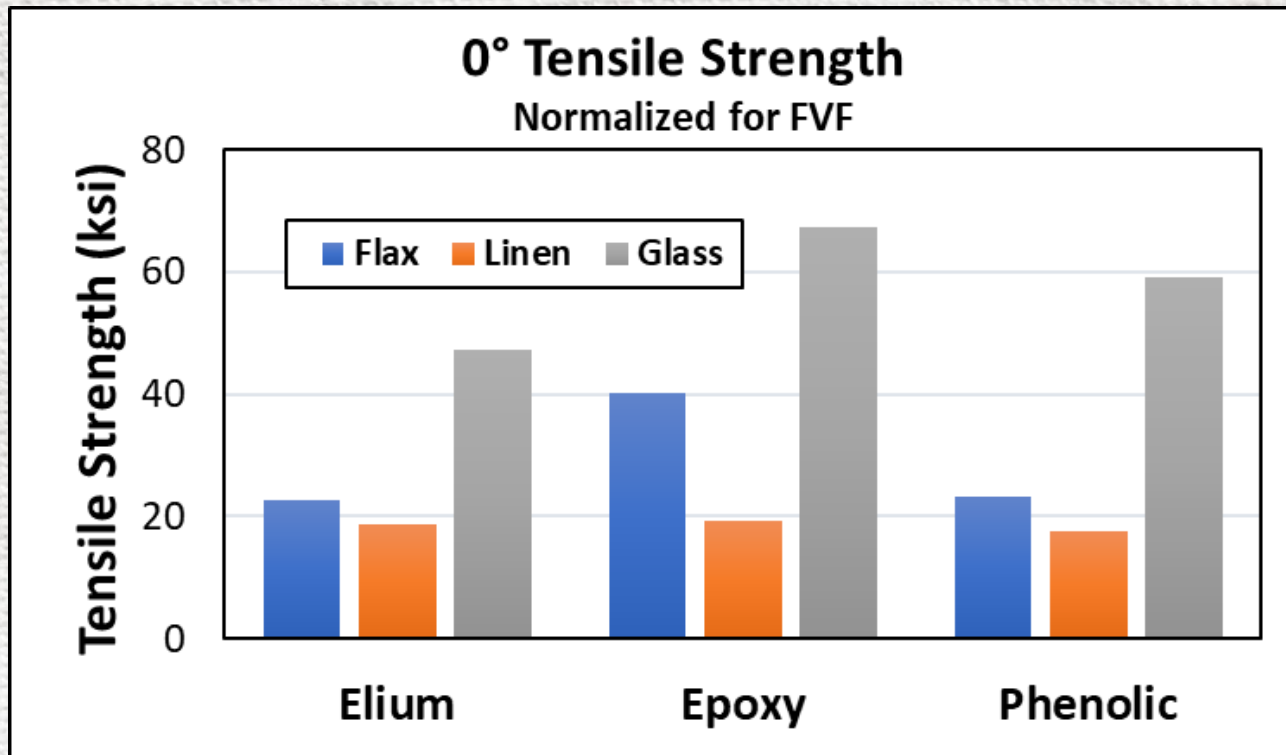


Flexural Properties



**Normalized to 60% fvf
Not density adjusted**

Tensile Data



**Normalized to 60% fvf
Not density adjusted**

Next Steps

- Optimize consolidation process – work to improve bond between layers
- Seek market feedback and test in downstream processes

Thank you to IACMI for the support on this important process development work!

Visit with us in the exhibition area!

Dustin Davis

Director of Sales and Business Development
ddavis@norplex.com

Jeff Schumm

Project Manager
jschumm@norplex.com

NORPLEX
Developers and Manufacturers of Composite Materials