MODERN·MILL

A FRESH APPROACH TO BUILDING MATERIALS

AIA Continuing Education Provider

BIOPHILIC DESIGN FOR ALL

Affordable, Low-Maintenance Materials That Mimic Nature

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Provider Number: 10009174
Course number: MMBiophilic

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course title:
Biophilic Design for All: Affordable, Low-Maintenance Materials that Mimic Nature

Course ID:
920026757

Approved for:
1 CE hour(s)

Course is approved for:
General

Approval date:
August 29, 2022

GBCI | GREEN BUSINESS CERTIFICATION INC.™

This course is approved by GBCI for continuing education. Approval for this course indicates it will be monitored by GBCI to ensure that it upholds the quality, relevance and rigor necessary to contribute to ongoing learning in knowledge areas relevant to the green building industry.

COURSE DESCRIPTION

Most architects understand biophilic design and agree with the concept of *bringing the outdoors inside* and the benefits this design offers our physical, mental and overall wellbeing.

However, few designers systematically incorporate it into their plans. Designers tend to assume that biophilic design is expensive or high maintenance, reserved for only high-end projects. Or assume that bringing *nature* inside is complicated and requires too much customization or cost. An architect may assume that some projects do not warrant biophilia, like a warehouse or other industrial settings.

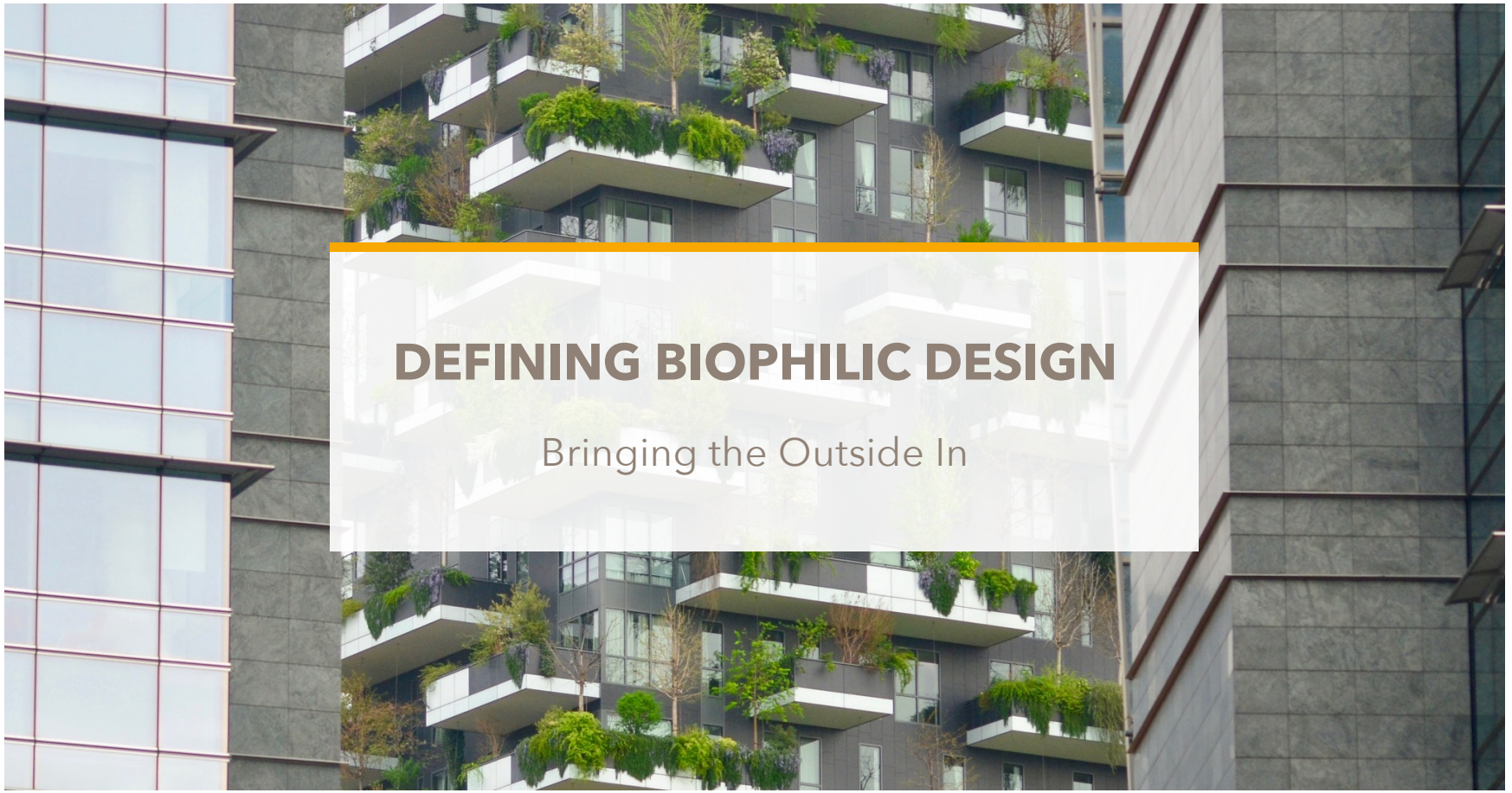
In this one-hour course, we'll address the assumptions that hold back an effort to scale biophilic design and expand access to these life-changing and sustaining benefits. We'll introduce a simulated-wood product that mimics nature and elicits that positive human response. You'll see numerous design ideas and applications that exemplify economical and low maintenance solutions for any project type.

At the end of the course, we think you'll agree that biophilic design is obtainable for any project and every occupant and making it accessible to all is a noble and worthy goal.

LEARNING OBJECTIVES

At the end of this course, participants will be able to:

1. Define the concept of biophilic design including the human response to nature. Elaborate on the misconceptions of biophilia that may hold the design community back
2. Describe the psychological, economical, and environmental benefits of biophilic design
3. Explain how building products that mimic nature can illicit the same human response as natural materials
4. As an example, discuss simulated-wood products and their use in biophilic design. List the benefits of this tree-free solution that looks and performs like wood, is economical, and low maintenance
5. Identify the numerous design solutions and applications for these simulated-wood products



DEFINING BIOPHILIC DESIGN

Bringing the Outside In

THE ELEMENTS OF BIOPHILIA

Water

Stone

Wood

Plants

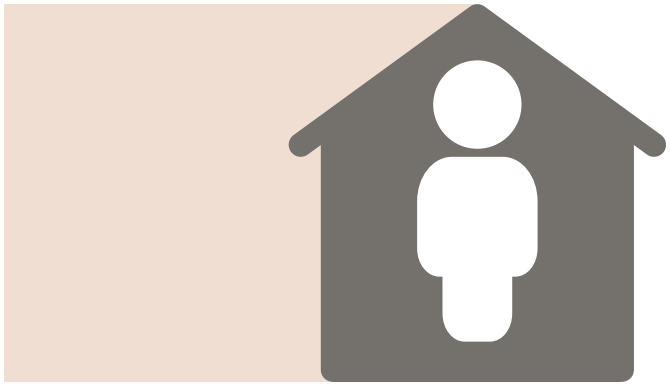
Light

WHAT QUALIFIES AS BIOPHILIC?

"If a design doesn't focus on aspects of the natural world that contribute to human health and productivity in the age-old struggle to be fit and survive, it's not biophilic."

Stephen Kellert

THE NEED FOR NATURE



The average person spends **90%** of his/her life indoors.

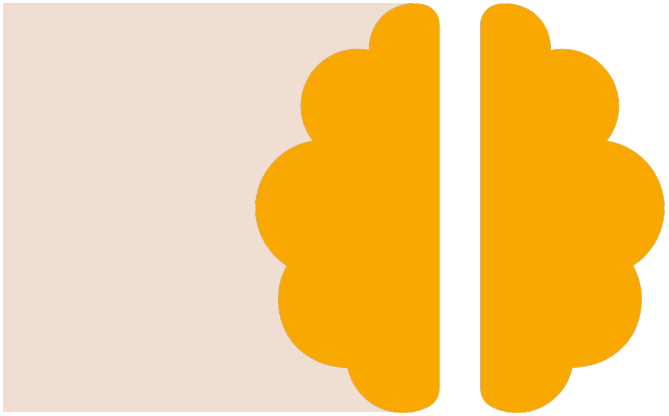

BIOPHILIC BENEFITS
Beyond Stress Reduction

WELLBEING AND BEYOND

Psychological and Physical

Economical

Environmental



PSYCHOLOGICAL AND PHYSICAL BENEFITS

- Reduced Stress and Stress Hormones
- Enhanced Creativity
- Clarity of Thought and Increased Focus
- Connection and Feeling Included
- Expedited Healing
- Lower Blood Pressure

ECONOMIC BENEFITS

- Employee Retention
- Fewer Sick Days
- Greater Productivity
- Shorter Stays in the Hospital

ENVIRONMENT BENEFITS

- Purify the Air
- Regulate Temperature
- Awareness Climate Change
- Connection and Appreciation of Nature
- Reduction of the Building's Carbon Footprint


A BEGINNERS' MIND
Learn to Create Better Spaces for All Humans

IS IT TRUE?

Biophilic design is all about plants.

IS IT TRUE?

Biophilic design is reserved for high-end projects; it cannot be scaled or accessible to all



IS IT TRUE?

Only natural materials can be specified.


SOLUTIONS THAT MIMIC NATURE
Six Design Options That Mirror the Outdoors

Can Simulated Nature Provide the Same Biophilic Benefits as True Nature?

YES!

Biometric design embraces both direct and indirect experiences of nature

Direct experiences

Direct experiences include light, air, plants and natural landscapes–the elements featured by urban forests

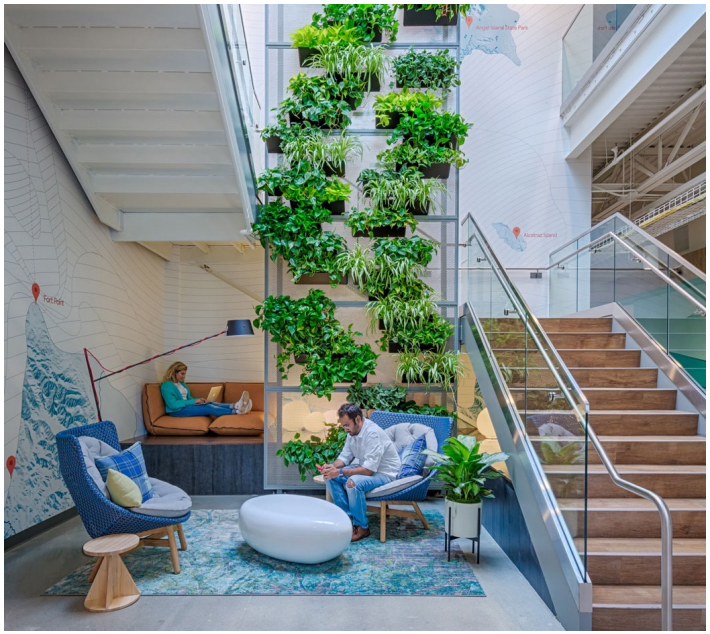
Indirect experiences

Indirect experience includes not only natural materials but images of nature in photographs, paintings, and other representation, as well as biomimicry of form and function.

THE HUMAN RESPONSE IS THE SAME

"A simulated natural environment reduces stress as much as spending the same amount of time outdoors."

Kjellgren and Buhrkall

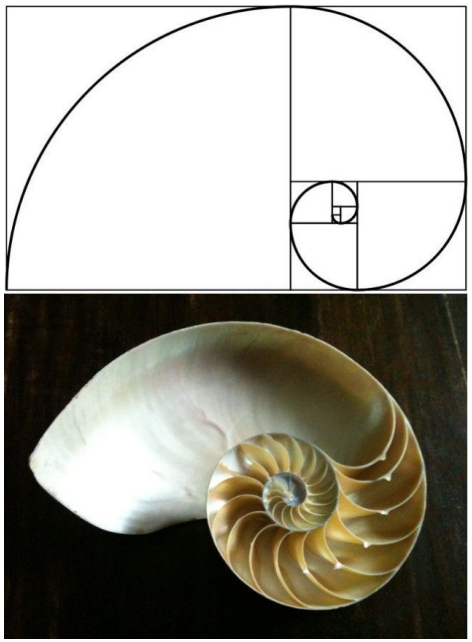


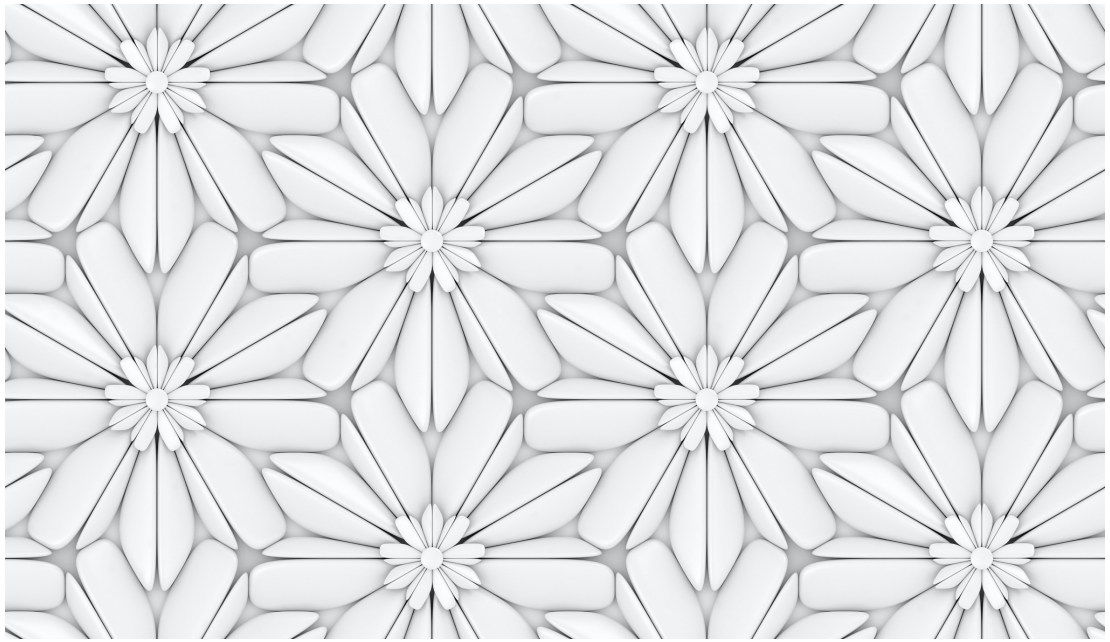
SIMULATED NATURE BIOPHILIC-DESIGN CRITERIA

- Relates to human survival
- Repeated and sustained encounters with nature
- Fully integrated within an overall space
- Fosters an emotional attachment to the setting
- Fosters positive relationships among people and nature

ART

BIOMORPHIC PATTERNS





COLOR

Green and Natural Wood Combinations Work Well

LIGHTING

Mimic Circadian Rhythm

VENTILATION

Variability to match the outdoors

SIMULATED-WOOD PRODUCTS

Look and feel like wood.
Tree Free

SIMULATED-WOOD SELECTION CRITERIA

Harm-Free

Sustainable

Practical

Real Nature

- Costly
- High-maintenance
- Customized
- Difficult to scale
- Resource heavy

Simulated Nature

+ Competitively prices
+ Durable, low maintenance
+ Standardized
+ Easily Scalable
+ Accessible

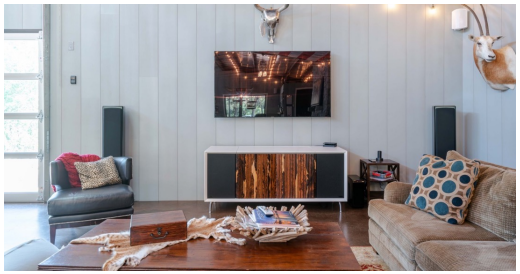

SIMULATED WOOD PRODUCTS
A Tree-Free Biophilia Solution

A NEW PRODUCT CATEGORY

An extruded product made of upcycled rice hulls

LOOKS AND FEELS LIKE WOOD: APPLICATIONS

For use in any interior and exterior application (except structural)



LOOKS AND FEELS LIKE WOOD: CONSISTENT

Every board is straight and consistent

LOOKS AND FEELS LIKE WOOD: DURABLE

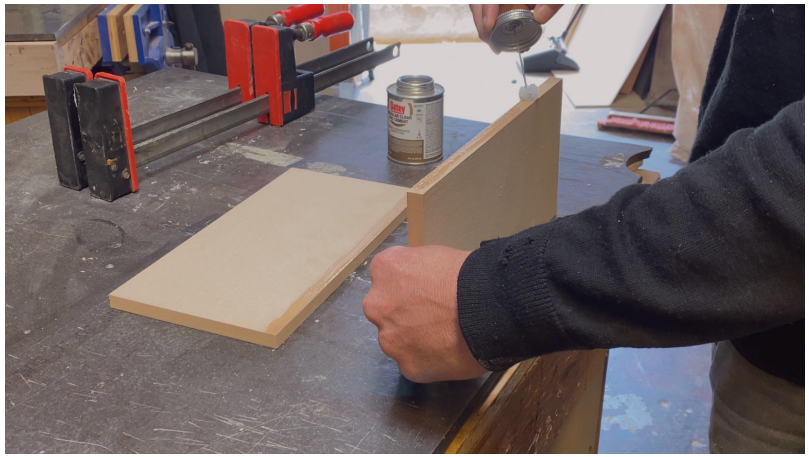
Will not rot, splinter, or warp

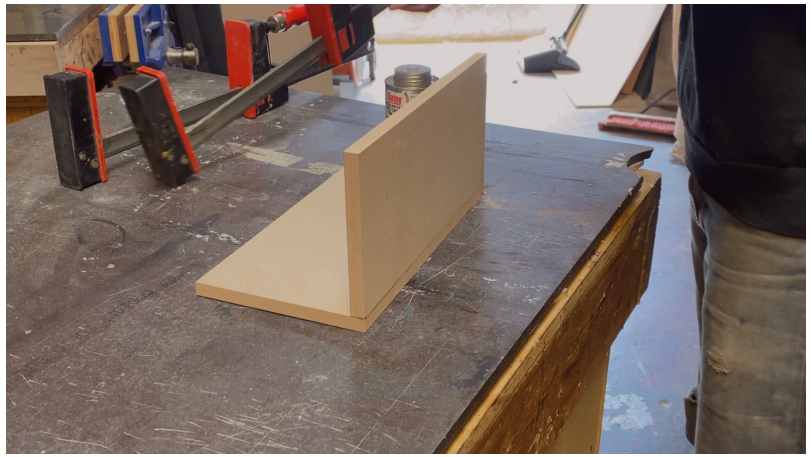
LOOKS AND FEELS LIKE WOOD: FINISHING

Sand-able, paintable, stainable, digitally-print or leave natural

LOOKS AND FEELS LIKE WOOD: ADHESIVES

Joints Can Bond with a Variety of Adhesives





LOOKS AND FEELS LIKE WOOD: HARDWARE

Use the same fasteners as you would for wood.

Exterior hardware should be weather-resistant: stainless steel or hot-dipped galvanized.

LOOKS AND FEELS LIKE WOOD: TRADITIONAL SIZES & PROFILES

- Sheet Goods
- Trim Board and Dimensional Lumber
- Decking & Porch Boards
- Siding & More

Sheet Good

Thickness: 1/4" to 15/16" (actual)

Width: 4 feet

Length: 8 feet to 20 feet

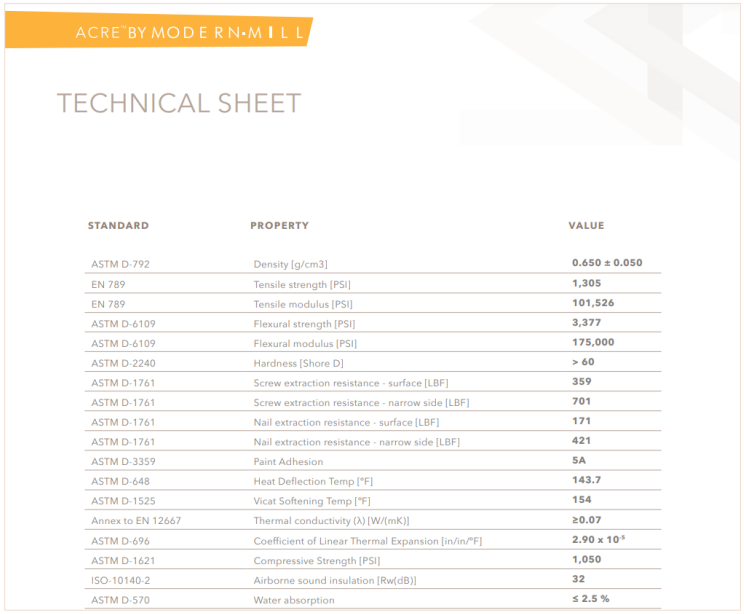
Decking, Porch Boards, Siding, Trim and more profiles available in traditional dimensions

THIRD-PARTY TESTING: CLEAN AIR GOLD

No

- VOCs
- Phenol
- Formaldehyde
- Adhesives

THIRD-PARTY TESTING: MOISTURE

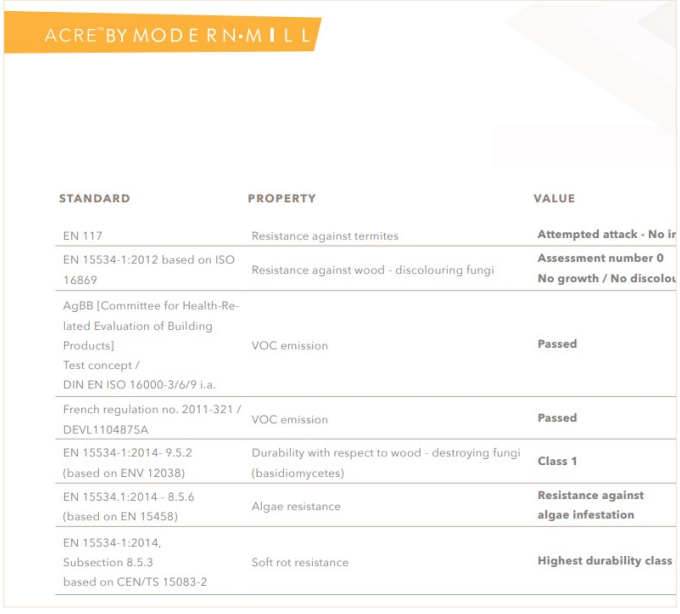


ACRE™ BY MODERN•MILL

TECHNICAL SHEET

STANDARD	PROPERTY	VALUE
ASTM D-792	Density [g/cm3]	**0.650 ± 0.050**
EN 789	Tensile strength [PSI]	**1,305**
EN 789	Tensile modulus [PSI]	**101,526**
ASTM D-6109	Flexural strength [PSI]	**3,377**
ASTM D-6109	Flexural modulus [PSI]	**175,000**
ASTM D-2240	Hardness [Shore D]	**> 60**
ASTM D-1761	Screw extraction resistance - surface [LBF]	**359**
ASTM D-1761	Screw extraction resistance - narrow side [LBF]	**701**
ASTM D-1761	Nail extraction resistance - surface [LBF]	**171**
ASTM D-1761	Nail extraction resistance - narrow side [LBF]	**421**
ASTM D-3359	Paint Adhesion	**5A**
ASTM D-648	Heat Deflection Temp [°F]	**143.7**
ASTM D-1525	Vicat Softening Temp [°F]	**154**
Annex to EN 12667	Thermal conductivity (λ) [W/(mK)]	**≥0.07**
ASTM D-696	Coefficient of Linear Thermal Expansion [in/in/°F]	**2.90 x 10^{-5}**
ASTM D-1621	Compressive Strength [PSI]	**1,050**
ISO-10140-2	Airborne sound insulation [Rw(dB)]	**32**
ASTM D-570	Water absorption	**≤ 2.5 %**

Stands Up To Moisture.
ASTM D-570 <2.5%



ACRE™ BY MODERN•MILL

STANDARD	PROPERTY	VALUE
EN 117	Resistance against termites	**Attempted attack - No ir**
EN 15534-1:2012 based on ISO 16869	Resistance against wood - discolouring fungi	**Assessment number 0** **No growth / No discolou**
AgBB [Committee for Health-Related Evaluation of Building Products] Test concept / DIN EN ISO 16000-3/6/9 i.a.	VOC emission	**Passed**
French regulation no. 2011-321 / DEVL1104875A	VOC emission	**Passed**
EN 15534-1:2014- 9.5.2 (based on ENV 12038)	Durability with respect to wood - destroying fungi (basidiomycetes)	**Class 1**
EN 15534.1:2014 - 8.5.6 (based on EN 15458)	Algae resistance	**Resistance against algae infestation**
EN 15534-1:2014, Subsection 8.5.3 based on CEN/TS 15083-2	Soft rot resistance	**Highest durability class**

Stands Up to Fungi and Algae.
EN 15534

THIRD-PARTY TESTING: WILDLAND URBAN INTERFACE (WUI) CODES AND STANDARDS

Class B WUI Code Pass

U.S. Fire Administration
Working for a fire-safe America

https://www.usfa.fema.gov/wui/

THIRD-PARTY TESTING: TERMITES AND PESTS

Stands Up To Pests.
EN 117 (Attempted attack, no infestation)

ACRE™ BY MODERN•MILL

STANDARD	PROPERTY	VALUE
EN 117	Resistance against termites	**Attempted attack - No infestation**
EN 15534-1:2012 based on ISO 16869	Resistance against wood - discolouring fungi	**Assessment number 0 No growth / No discolouration**
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THERMOFORMABLE FOR CURVES

Thermoformable, Perfect for Curved Designs.

LOWER COST: MATERIALS

Lower Materials Cost than Traditional Materials with Similar Aesthetic and more durable than IPE, Teak, or Cedar

LOWER COST: MAINTENANCE

Minimal Maintenance
and Easy Repair

LOWER COST: LIMITED LIFE-TIME WARRANTY

Lasts for the Life of the Installation

LIFETIME LIMITED WARRANTY

Statement of Warranty

This warranty is provided to the original purchaser or the owner of the property at the time of installation (Purchaser) of products (Product). Visit www.modern-mill.com for the latest terms and conditions related to product warranty.

Products are to be within the limits and of the sizes published by Company, and subject to Company's standard tolerances for variations. Within these limits, warrants that for the lifetime of the Product, Product will be free from material defects in workmanship or corrosion, rotting, splintering and excessive swelling as a direct result of the manufacturing process or by normal use and service provided conditions described in all installation materials and technical guides are met.

Prior to purchase, each Purchaser is solely responsible for determining the effectiveness, suitability and safety of any particular use or application of the Product and agrees to follow local building code regulations. Each Purchaser recognizes their obligation to consult local building and safety codes for specific requirements. Under no circumstances should products be burned or used as a heat source. products are not approved for structural building support.

Not covered by this Warranty. liability under this Warranty is limited solely and exclusively to replacement of defective Products. In no event shall responsible or liable for labor, installation, reinstallation, freight, taxes or any other charge related to defective Products.

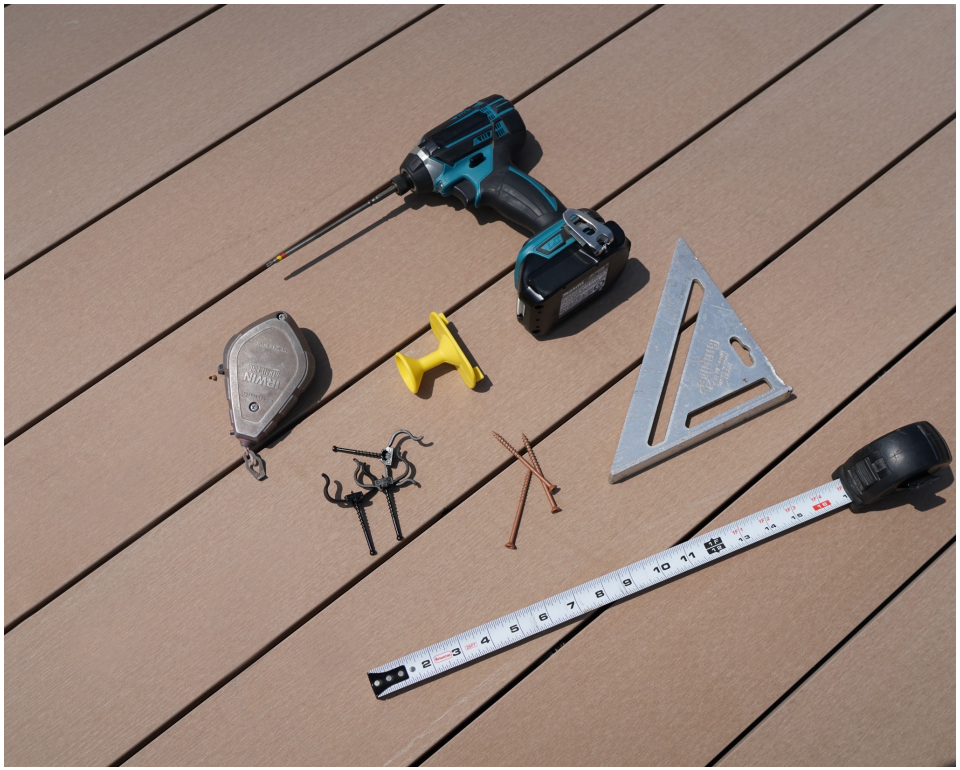
shall not be liable for any indirect, incidental, punitive, consequential, exemplary or other damages of any kind whatsoever, whether any such claim is based upon theories of contract, warranty, negligence, tort strict liability or otherwise. This warranty does not cover and not liable for damage or failure of the Products as a result of one or more of the following: intentional or unintentional misuse of or damage to the Product; impact of foreign objects; earthquakes, fire, flood, lightning, ice, tornado, hurricane, windstorm or any other Acts of God; improper installation of the Product or its structural supports; movement, settlement, distortion, warping or cracking of the Products structural supports or accessories used in connection therewith; physical abuse, vandalism, riot, insurrection, improper maintenance, use or incompatible accessories; or other products that cause a Product defect or failure to occur; pollution, acid rain, application of harmful chemicals or vapors applied to the Product; or ordinary and expected weathering due to exposure to the elements; which for purposes of this Warranty is defined to be fading, greying or darkening of the surface of the Product due to exposure to ultraviolet light and weather extremes that are unique to and may vary in each geographic location. This Warranty does not cover painted finishes or coatings applied to the Product by the Purchaser or any third party. Failure to adhere to recommendations for application of painted surfaces will void this Warranty. All claims under this Limited Warranty must be made within 90 days from the time that the defect is

LOWER COST: EASE OF INSTALLATION

Affordability Through Standardization

LOWER COST: EASE OF INSTALLATION

No Special Tools or Training.



SUSTAINABLE: MATERIALS

Rice Hulls - Responsibly Sourced, Upcycled Raw Materials

SUSTAINABLE: MANUFACTURING

Zero-Waste Manufacturing

100% recyclable

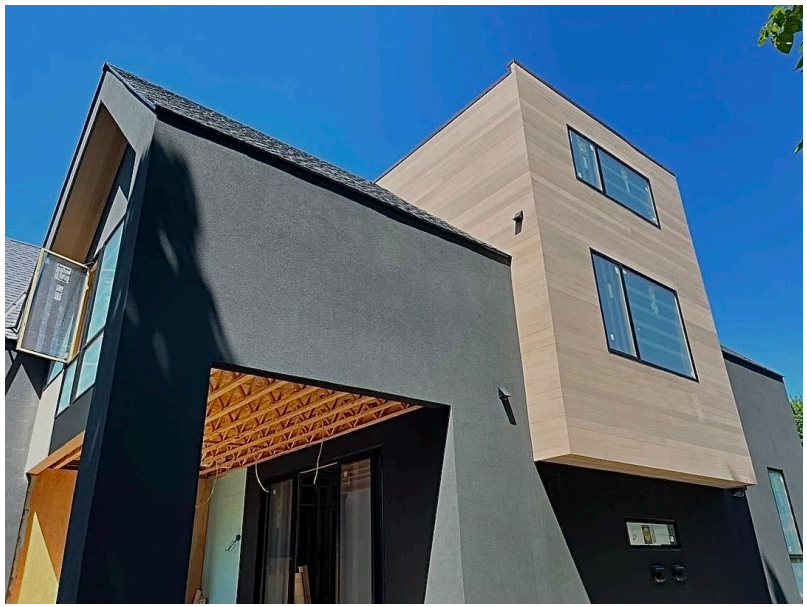
Made in America

SUSTAINABLE: LIFE-CYCLE ANALYSIS

- Upcycled Rice Hulls
- Zero-Waste Manufacturing
- Central Distribution
- Extended Use Life
- Reuse, Recycle at End of Life

SUSTAINABLE

Reduced Embodied Carbon with Extended Product Life



SUSTAINABLE

- Contributes to LEED Points
- Materials and Resources
- Indoor Environmental Quality
- Innovation and Design Process
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Regional Priority

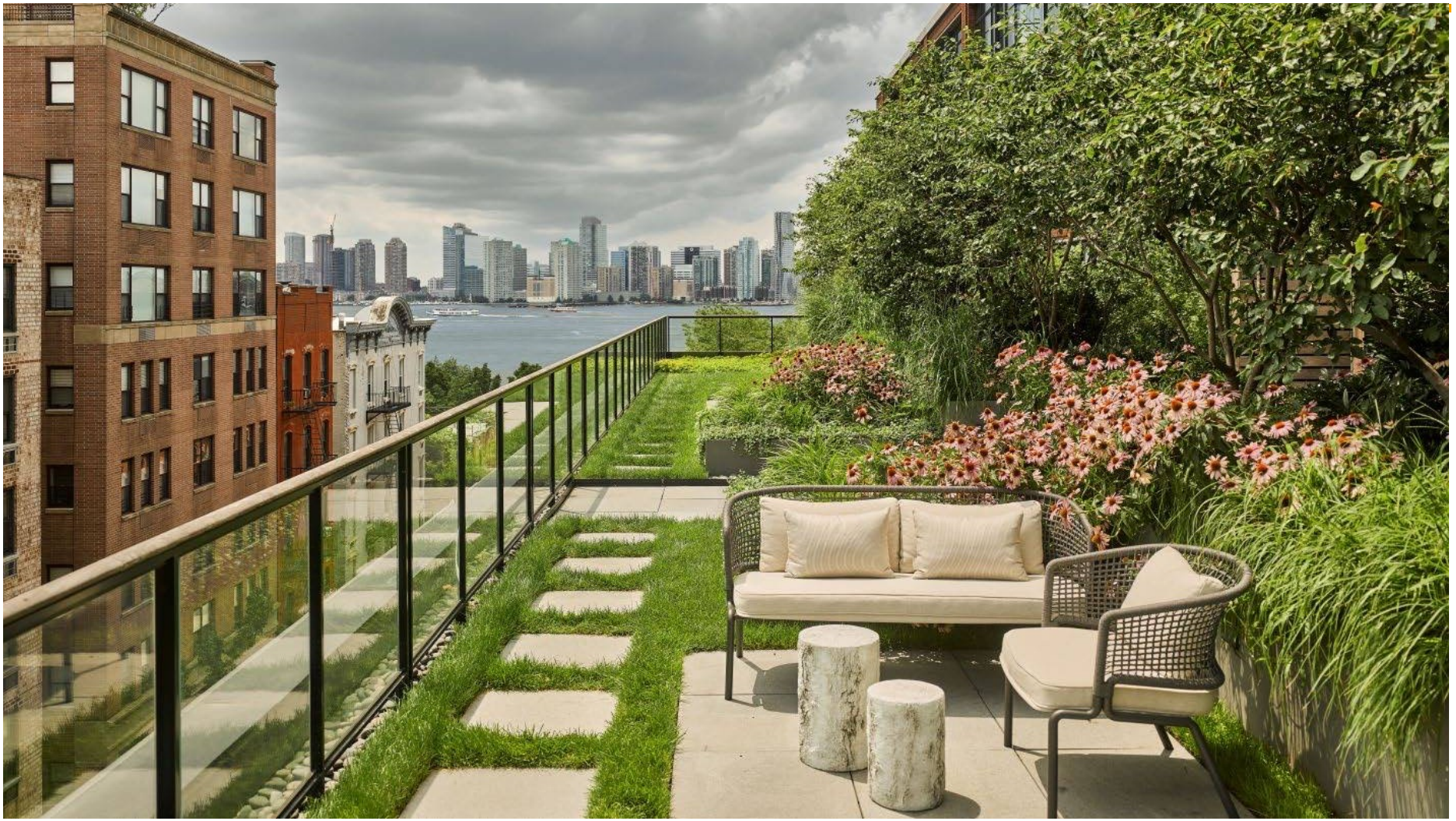

BIOPHILIC DESIGN INSPIRATION
Simulated Wood Products for Interior and Exterior

INTERIOR APPLICATIONS
SUPPORTING BIOPHILIC DESIGN

MODERN·MILL


MODERN-MILL

EXTERIOR APPLICATIONS



Our Inspiration: A New, Broader View of Biophilic Design

- Biophilic design has helped architects awaken our innate human responses to our built environment
- Design can go beyond sheltering us to create environments that are healing and restorative
- Until now, attention has focused primarily on high-profile biophilic projects with significant costs in money, labor, materials, and environmental impact
- Now, time has come to bring practicality, sustainability and accessibility into the conversation
- Simulated nature may play a surprising role in helping us protect the real thing.

By democratizing biophilic design while narrowing its environmental footprint, materials like sustainable wood alternatives can help create projects that are:

Better for humans

Better for society

Better for Planet


QUESTIONS?

THANK YOU

This concludes The American Institute of Architects (AIA) Continuing Education Services (CES) Course.

MODERN MILL
Modern-Mill.com

AIA Continuing Education Provider

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MEET MODERN MILL

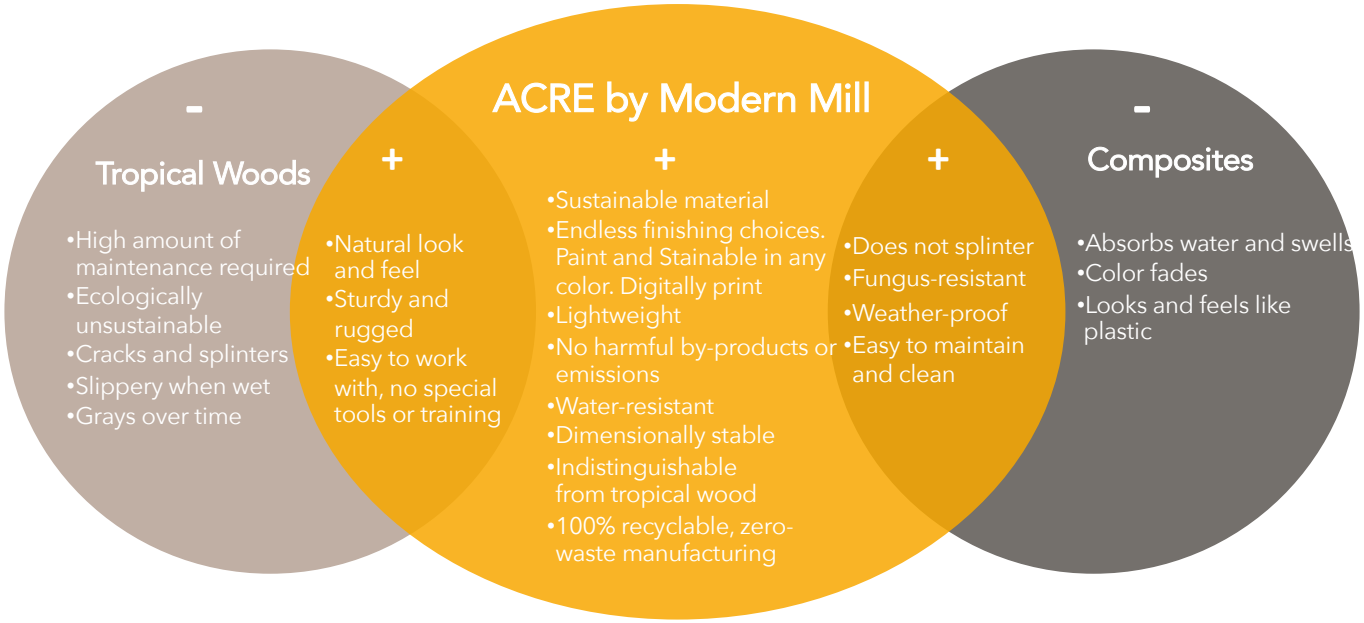
We're a team on a mission!

We are creating a new generation of building materials to build a more sustainable future. Bringing fresh innovation and new inspiration to the world, right from the heart of Mississippi.

Embracing our responsibility and commitment to:

SUSTAINABLE INNOVATION

ACRE offers the benefits of wood and composites without the downsides – and brings numerous additional benefits as well.



SUSTAINABLE INNOVATION

ACRE is a revolutionary material made with more than 50% up-cycled rice hulls

Durable

- Resistant to water, weather and pests – including termites!
- No splintering, cracking or warping
- Suitable for ground and water contact
- No splintering, cracking or warping
- No special maintenance or cleaning methods needed
- Industry-leading guarantee

Better Workability than Wood

- Paintable & even stainable (with water-based coatings and does not require a primer)
- Easily routed, cut, and sanded in the field like a wood material
- Easy on tools – no melting or static-charged dust
- No harmful dust or residue
- No need to seal or treat ends
- Pre-drilling not required. Screws and nails will not mushroom.
- Uniform texture throughout and finish-ready

Natural Beauty

- Genuine warm look and feel of wood
- Natural-looking grain
- Endless finish options with of water-based paints or stains

Technical Benefits

- Sturdy, resists breakage and job site damage
- Debris from cutting will simply fall and brush off surfaces and clothing – less static cling than traditional PVC
- Refreshingly easy on blades and tools when routing, cutting, and screwing
- Strong screw and nail retention. Intense bond with a wide range of glues and construction adhesives
- Smooth screw application close to edges, and into sides without splitting – no need to pre-drill
- Virtually no moisture, paint lasts longer than on wood
- 15-25% less expansion and contraction than competitive PVC products
- Lightweight, yet strong and straight
- Thermoform for folded corners, curves and creative shapes
- Digitally print directly on ACRE's surface

Sustainable Innovation

- Made in the U.S.A.
- 100% tree-free
- Upcycled natural fibers from discarded rice hulls, a rapidly renewable resource
- Free of phenol, formaldehyde and adhesives
- Zero-waste manufacturing
- 100% recyclable

CONTACT US

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