



NOVA

EXODEK QUICKCLIP

"The ONLY Hidden Deck Fastener that
Allows Wood to Expand and Contract Naturally."

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Background: The Basics

Why Use Hardwood Decking?

Why Use Deck Clips/Hidden Fasteners?

Environmental Factors

Relative Humidity and Effects on Wood

Maximum Deck Board Expansion

Why Use Hardwood Decking?

- **Sustainability:** Hardwood is naturally abundant and harvested responsibly, allowing for more growth than removal
- **Biodegradable:** Environmentally friendly, unlike concrete or PVC and composite decking
- **NO microplastics:** Usage of microplastics is nonexistent through production and lifecycle
- **Energy Saver:** Less energy is used to produce hardwoods in comparison to aluminum, brick, concrete and steel
- **Sequesters Carbon:** Aluminum, brick, concrete and steel produce and release carbon, whereas hardwood sequesters it, making it a more environmentally friendly option



More Than Environmentally Friendly

- *Aesthetically Pleasing*: Unbeatably beautiful with the ability to fit any personal style
- *Durability*: Long lasting and easy to maintain

Why Use A Deck Clip?

- **Time:** Deck clips allow for quicker installation
- **Costs:** Lower labor costs result in lower project costs
- **Reduced Intrusions:** No need to drill through deck boards allowing for,
 - No top facing holes, preventing unnecessary moisture pockets
 - Less standing water meaning less rot and less mold
 - Lowered splintering possibility
- **Sleek:** Creates a smooth and consistent visual appearance

Background: The Basics

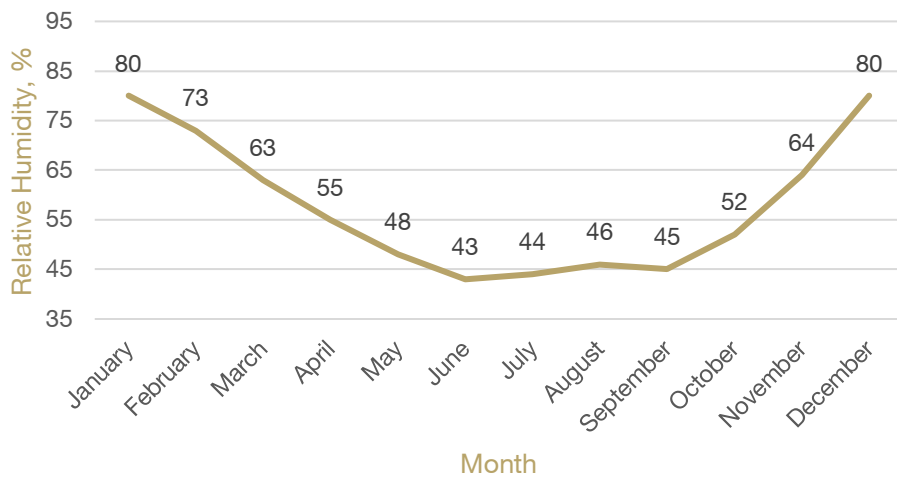
Why Use Hardwood Decking?
Why Use Deck Clips/Hidden Fasteners?
Environmental Factors
Relative Humidity and Effects on Wood
Maximum Deck Board Expansion

Environmental Factors

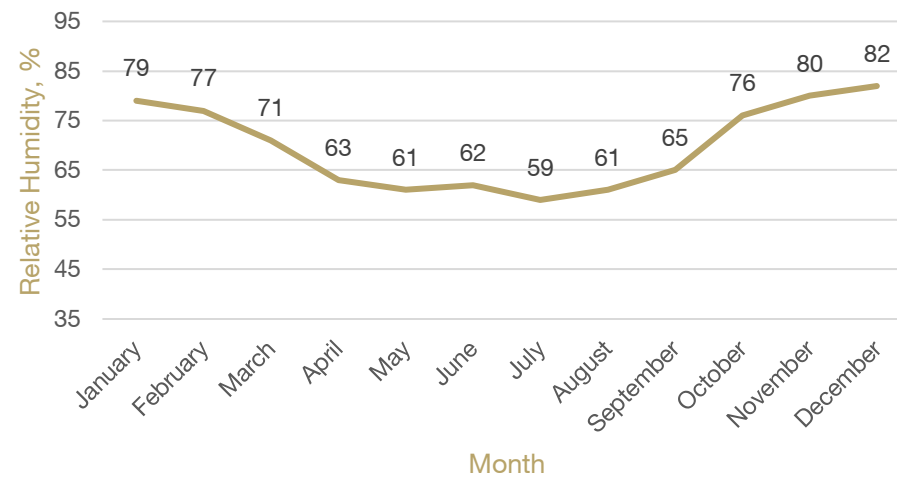
ALL climates experience humidity fluctuations throughout the year. Some examples include:

- **California:** Relative humidity (RH) can range from 30% to 80% in a yearly cycle
- **Pacific Northwest:** Predominate rainy season with prolonged high humidity levels
- **The Midwest:** Extreme storms including snow and wind

Monthly Average Relative Humidity for Sacramento, CA



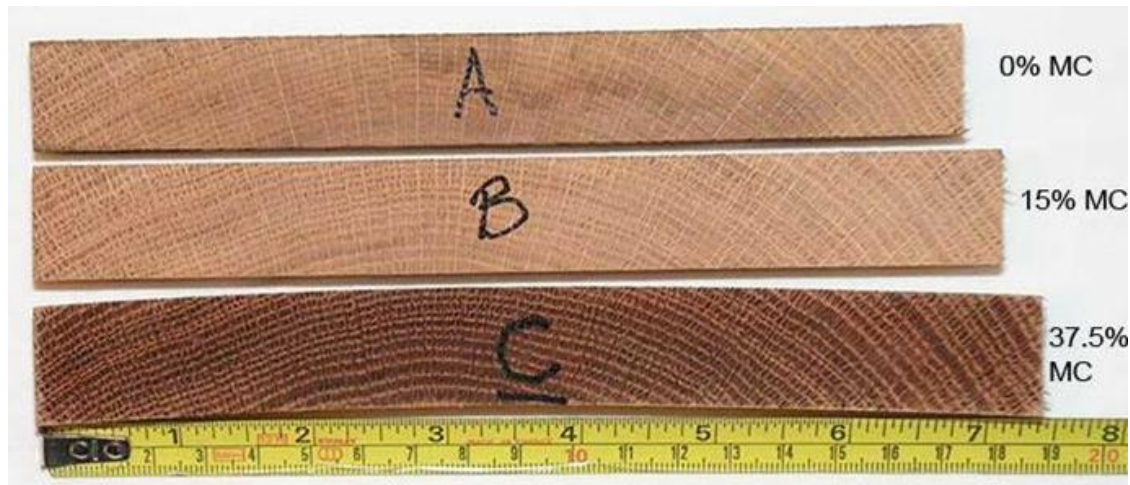
Monthly Average Relative Humidity for Portland, Oregon



Relative Humidity Effects on Wood

Expansion is seen when wood absorbs the moisture from its environment (fluctuating with humidity levels)

Shrinkage occurs when wood dries out due to lack of moisture and lowered humidity levels



Moisture Content (MC)

The measure of how much moisture is within wood. This value changes with the environmental conditions.

Relative Humidity Effects on Wood Cont.

- Moisture content of wood in relation to RH ranges 6% to 16% for typical North American environments
- Moisture content of wood is proportional to the expansion percentage
 - Variations are seen in relation to growth ring direction
- Deck boards mostly expand across their width

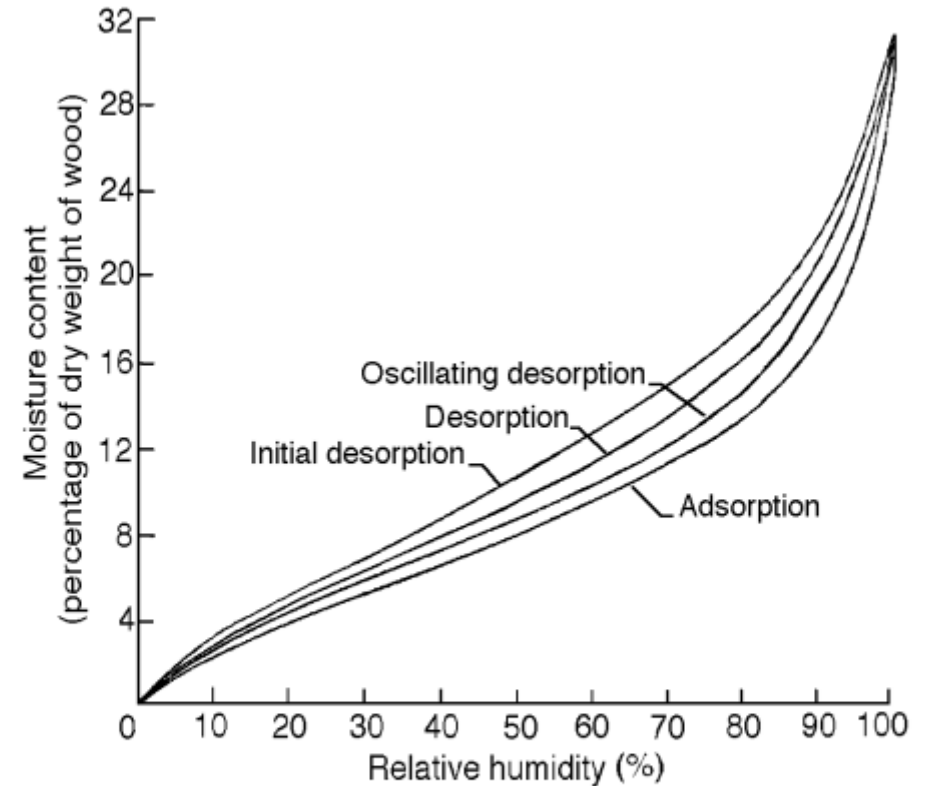


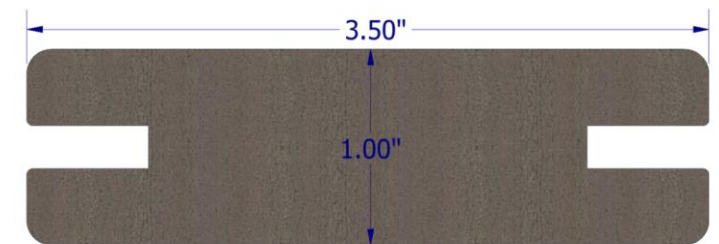
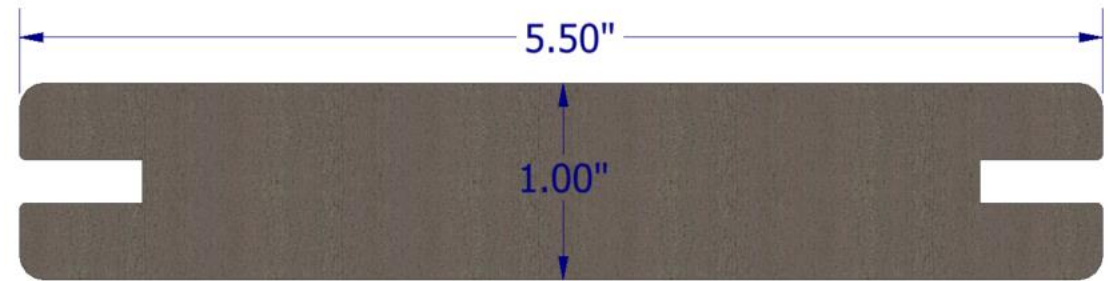
Figure 3–2. Moisture content–relative humidity relationship for wood under adsorption and various desorption conditions.

Maximum Deck Board Expansion

- Most companies use grooved boards that are 3.5" wide or 5.5" wide
- Expansion can be calculated as:

$$\frac{(16\% - 6\%) * 7\%}{(24\% - 0\%)} * 5 \frac{1}{2}'' = 0.16 \text{ inches}$$

The best, safest spacing to leave between your deck boards is 1/4 inch!



Issues in the Current Market

The Problems With Other Clips/Hidden Fasteners

Failed Deck Examples

Conclusion

The Problems With Other Clips/Hidden Fasteners

- All other clips/hidden fasteners are unable to compensate for the natural expansion and contraction of hardwoods or softwoods, while maintaining the integrity of the clips AND the deck boards
- Common negative results seen with other clips/hidden fasteners:
 - Crushing or breaking due to expansion pressure
 - Bending and permanently deforming after a single season
 - Buckling or shifting deck boards
 - Ripping out from the underside of the structure risking overall integrity



The Problems With Other Clips/Hidden Fasteners: Installation

Other clips/hidden fasteners require an installation drilling angle of 45°. This can cause an array of issues including,

- High increase in time and energy used due to single row installation
- Heightened risk of damaging deck boards
- Reduced expansion opportunity by 50%
- Requires pre-drilling and in turn additional tooling



Issues in the Current Market

The Problems With Other Clips/Hidden Fasteners
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Conclusion

Failed Deck, Example 1

45° Install Using Batu Boards with No Clips/Hidden Fasteners



Failed Deck, Example 1

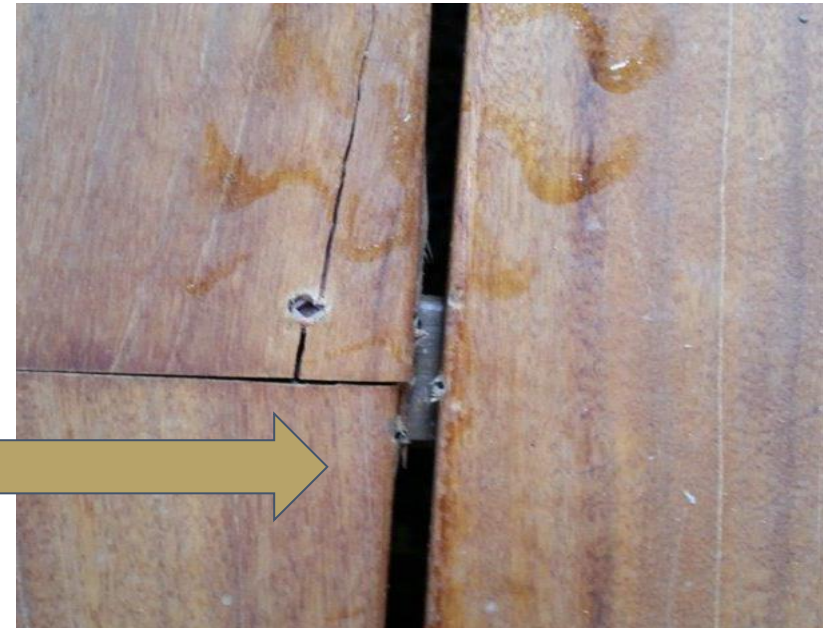
45° Install Using Batu Boards with No Clips/Hidden Fasteners



Screws ripped through the board from the underside of the structure. This presents an injury hazard as well as increased instability of the structural integrity.



A repair was attempted, leading to further structural and visual damage.



Example 1: What Happened?

Installation: The deck was installed by drilling through the deck boards into the joist at a 45° angle

Environment: The wood was in a high humidity environment when installed and as the boards dried out, they shrank

Results:

- Screws tore through both the deck boards and the joists
- Boards splintered, cracked and warped
- **Unrepairable damage** was developed, both structurally and visually

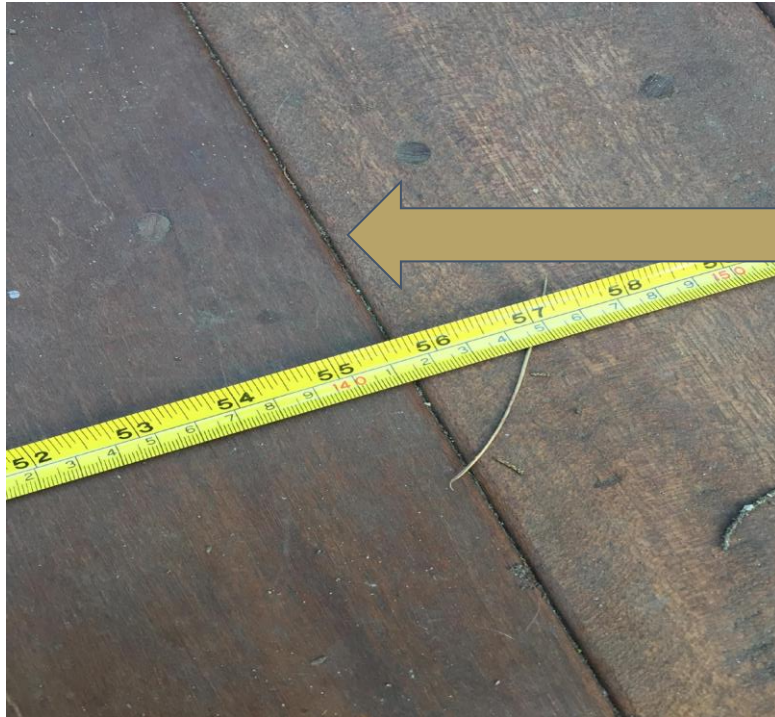
Failed Deck, Example 2

Top-Down Installation of Batu Boards with No Clips/Hidden Fasteners Without Ample Spacing



Failed Deck, Example 2

Top-Down Installation of Batu Boards with No Clips/Hidden Fasteners Without Ample Spacing



Not enough space between boards was allowed during installation.



No clip/hidden fastener was used to maintain spacing, resulting in uneven and buckled boards.

Example 2: What Happened?

Installation: The boards were installed with a traditional method which used screws vertically placed through the boards and into the joists. Proper deck spacing was not used.

Environment: The boards expanded without ample spacing and no clips/ hidden fastener were present to maintain control.

Results:

- Damaged boards and joists
- **Severely** buckled deck

Conclusion

- Installation that requires fastening the boards by driving a screw through them:
 - Does not allow the boards any freedom to expand or shrink with moisture change
 - Makes a hole for water to enter the wood and wreak havoc including rot and decay
- You **cannot** stop wood from expanding or shrinking
- Wood **must** have the freedom to breathe, or it fail with heightened potential for dangerous outcomes

Top Competitors on the Market

Ipe Clip

EB-TY

Black Talon

CAMO

Mantis

Summary

DeckWise Ipe Clip



Ipe Clips



Ipe Clip Extreme



Ipe Clip Extreme S
(Extreme4)



Ipe Clip ExtremeKD



Ipe Clip Standard

Ipe Clip Extreme

Advertised Use	Air Dried Hardwoods or Green, Softwoods, Composite Decking
Material	Polyethylene (PE) with black oxide stainless steel insert
Board Spacing	3/32"
Installation Angle and Ability	45°, single row installation
Expansion Claims	<i>One</i> side of each board is "free to expand" but clip does not flex upon expansion
Online Retail Price	\$0.68 per part

Ipe Clip Extreme S (Extreme4)

Advertised Use	Kiln Dried Hardwoods, Softwoods, Composite Decking
Material	Polypropylene (PP) with black oxide stainless steel insert
Board Spacing	5/32"
Installation Angle and Ability	45°, single row installation
Expansion Claims	Collapsible legs "Allows hardwood boards to expand and contract without pushing into each other."
Online Retail Price	\$0.68 per part

Ipe Clip ExtremeKD

Advertised Use	Kiln Dried Decking, Composite Decking
Material	Polypropylene (PP) with black oxide stainless steel insert
Board Spacing	1/4"
Installation Angle and Ability	45°, single row installation
Expansion Claims	Pliable leg material will compress as deck material expands in width
Online Retail Price	\$0.68 per part

Ipe Clip Standard

Advertised Use	Air-Dried Hardwood, Composite Decking, PVC Decking
Material	Polyethylene (PE) and reinforced fiberglass
Board Spacing	3/32"
Installation Angle and Ability	45°, single row installation
Expansion Claims	One side of each board is "free to expand", does not flex upon expansion
Online Retail Price	\$0.60 per part

Customer Feedback – Ipe Clip

“Very pricey for some pieces of plastic. The light brown color shows through the gaps between the boards and looks like hell. Black clips would be much less noticeable. They do what they are supposed to do, but all in all, not a very elegant solution” – Amazon Customer

“This clips require a lot of extra work while installing a deck. Also grooving a 1x6 board doesnt leave much for it to hold onto.” –Home Depot Customer

“ I really tried to make the Ipe clips work. I spent \$600.00 on 5 boxes of clips. I spent several days assembling & disassembling my hardwood deck boards to the deck joists. I watched all the available videos on installation. I talked to representatives at both the hardwood company and the Ipe clip manufacturer.

When you secure the deck boards securely to the joists, it distorts the Ipe clip and the next deck board will not slide into the installed clips. If you try to force the deck board into the installed clips, the plastic separates from the metal, and you destroy the clip. The only way the clips will work, is if you, keep the clip loose. To me, this is unacceptable because means you cannot securely attach the deck board to the deck joists. There will be a gap between the deck board and the joist, and it will get worse with age.

...

I want a solid connection between the deck board and the joists so I will be using the tried and true method of larger #10 x 2-1/2 stainless steel screws through the face of the deck boards to the joist. They are 1/3 the cost and 1/2 the installation time” –Amazon Customer

Ipe Clip Design Critique & Analysis

- **Pre-drilling is required:** This can cause increases in various elements including,
 - Tooling needed (a drill and a driver)
 - Installation time
 - More labor efforts needed
- **45° installation:** This method of install includes,
 - Forcing customer to drill through deck boards
 - Reduced expansion abilities by 50%
 - Increased ability for water to enter the wood leading to damages such as rot
- Differing materials results in varying expansion rates of the clip
- **Specific Clip for Different Materials:** Multitude of clip offerings leads to developing an increased risk of needing to return product and/or unfinished projects

Simpson Strong-
Tie
EB-TY



EB-TY

Advertised Use	Hardwoods
Material	Plastic main body, 300 stainless steel fastener plate
Board Spacing	3/16" and 1/4"
Installation Angle and Ability	45°, single row installation
Expansion Claims	Designed for flexibility during seasonal expansion
Online Retail Price	\$0.59 per part

Customer Feedback – EB-TY

“These hidden deck fasteners worked for my new cedar deck, but there is room for improvement. Using a biscuit cutter did not work. The resulting deck was too uneven. I ended up ripping a groove in the wood. After that, the assembly was consistent and the boards fit much better. The other problem is that the fasteners are plastic. When the screws are installed the plastic tends to bend making it hard to install the next board. I ended up making a quick jig that was the same height as the groove. I slid the jig under the fastener before screwing it down. This kept the plastic from torquing. ” –Home Depot

EB-TY Design Critique & Analysis

- **Material and Design:** Limits versatility leading to the increased risk of product returns and unfinished projects.
 - No allowance for expansion or contraction is seen within the design
 - Differences in materials result in varying expansion rates of the clip
- **Installation:** Requires customer to glue down deck boards for proper installation to be accomplished
- **Claims:** “Prevent boards from walking or sliding”
 - No features of the clip support this claim

BlackTalon Universal Deck Fastener



BlackTalon

Advertised Use	Hardwood, Composite Decking
Material	301 Stainless Steel
Board Spacing	3/16"
Installation Angle and Ability	90°, multiple row installation
Expansion Claims	"Holds deck board tight while moving with deck board and not fatiguing over time."
Online Retail Price	\$0.52 per part

BlackTalon Customer Feedback

No customer reviews at this time

BlackTalon Design Critique & Analysis

- **Vague claims regarding expansion:** Stainless steel deforms once, then set after a single expansion cycle resulting in loose boards when they are not at peak expansion (i.e. majority of the year)
- Allows for multiple row installation
- No gap provided for air flow for the deck boards

CAMO EDGE Clip



CAMO EdgeClip

Advertised Use	Wood (does not specify hard or soft), Composite Decking, PVC Decking
Material	Nylon Plastic
Board Spacing	3/16"
Installation Angle and Ability	90°, multiple row installation
Expansion Claims	Claims to be 88% stronger than other leading manufacturers in "lateral movement tests." Clip does not flex upon expansion.
Price	\$0.41 per part

Customer Feedback – Camo EDGE

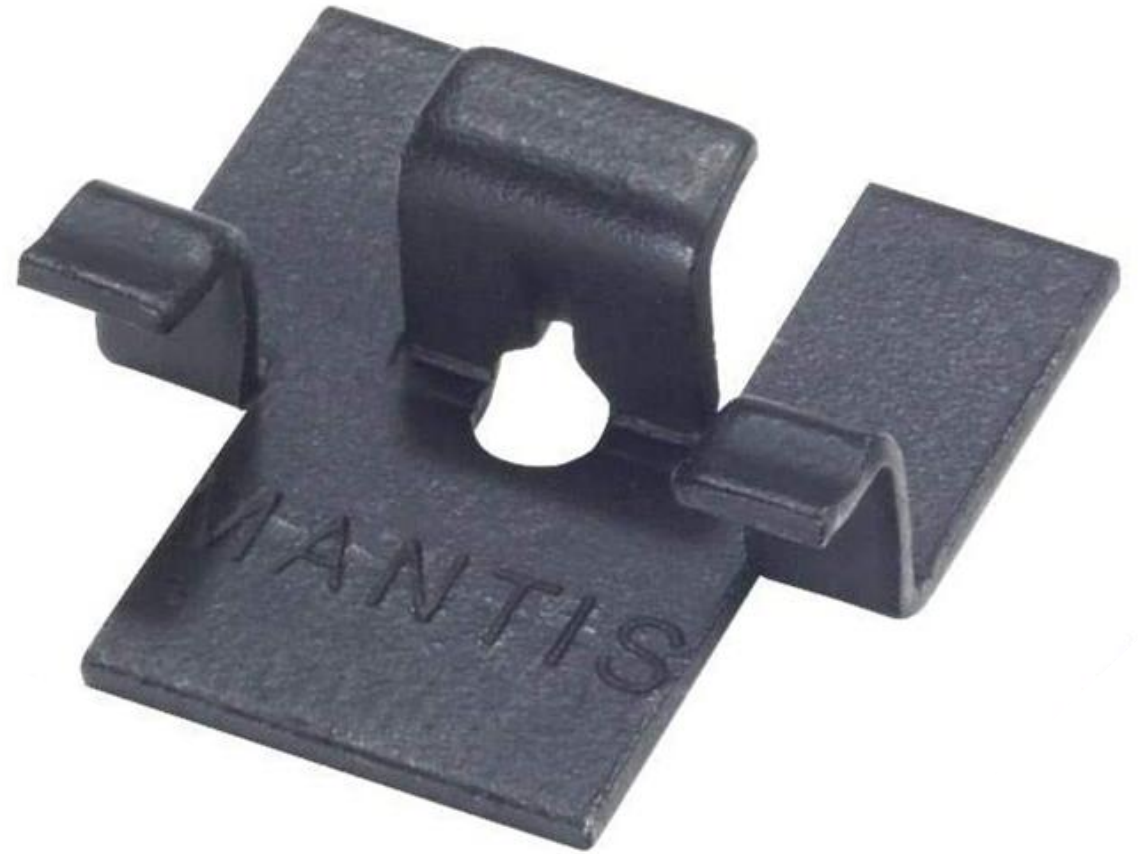
“ First, they give you multiple bits because they tend to go bad quickly and then you are stripping out the screw head. They need to make the bed with a more substantial piece of metal. Secondly, the wings to secure both of the boards down are not that long.” -Amazon

“We used these clips to install a large 1X6 lpe deck. This is the most difficult deck to lay as the wood is three times harder than a baseball bat and extremely difficult to straighten. The clip did not help. The tabs on either side are half the size of my little finger nail, way less than competing products. Is there a point to this? Because all of the difficulties we had resulted from the too-small tabs. Firstly they don't stay in place when laying out the wood. An 18'-0" board has (14) clips at 16" oc. Not once did all clips stay in place as we pressed the boards together, one or more would tip over jamming the boards apart. Secondly, and this is a design error of almost comedic import, the clips CANNOT BRIDGE A SEAM! How can one fasten (3) boards together with a tab the size of an aspirin? ... The workaround if you've already bought these clips is to cut off the plastic horseshoe tabs and use two clips on a single joist ... The video of installers laying out an entire deck before they insert the screws are fake and assume laser straight wood or plastic. We found two boards at a time with a bow wrench worked the best. Three older carpenters with decades of experience put this deck together, ultimately a nice product, but with a design modification enlarging the tabs this CAMO product would be something we would use again. ” – Amazon

CAMO EDGE Design Critique & Analysis

- **Design:** Specifically designed only for PVC and composite decking
 - would **NOT** work for wood applications with expanding boards
- **Strength:** No additional rigidity, only as strong as the screw used
- **Installation Needs:** Requires specialized tooling for proper installation
- **NO** rotation control
- Fingers only grip on 2" stringers
- Allows for multiple row installation

SENCO Mantis Clip



SENCO Mantis

Advertised Use	PVC Decking, Composite Decking, ACQ Treated Lumber
Material	High Strength Steel
Board Spacing	3/16"
Installation Angle and Ability	45°, single row installation
Expansion Claims	NONE – not for use of any decking material with seasonal expansions
Price	\$0.51 per part

SENCO Mantis Design Critique & Analysis

- **Design:** Specifically designed **ONLY** for composite decking which does not experience expansion like hardwoods.
- **Material:** Stainless steel deforms once, then set after a single expansion cycle resulting in loose boards when they are not at peak expansion (i.e. majority of the year)
- **Requires pre-drilling**
 - Increases installation time
 - Increases required labor efforts
- **45° installation:** This method of install includes,
 - Forcing customer to drill through deck boards
 - Reduced expansion abilities by 50%
 - Increased ability for water to enter the wood leading to damages such as rot

SENCO Mantis Customer Feedback

No customer reviews at this time.

Summary

NO other clips/hidden fastener have the expansion responsive mechanics that the ExoDek QuickClip does.

All other clips/hidden fasteners have the high potential for the following:

- **Install Time:** Majority of other clips/hidden fasteners require single row installation
- **Pre-Drilling:** Majority of other clips/hidden fasteners force the deck boards to be drilled through
- **No Expansion & Contraction Capabilities:** NO other clips/hidden fasteners on the market allow for repeated expansion and contraction of hardwood deck boards from both sides

Introducing the EXODEK QUICKCLIP

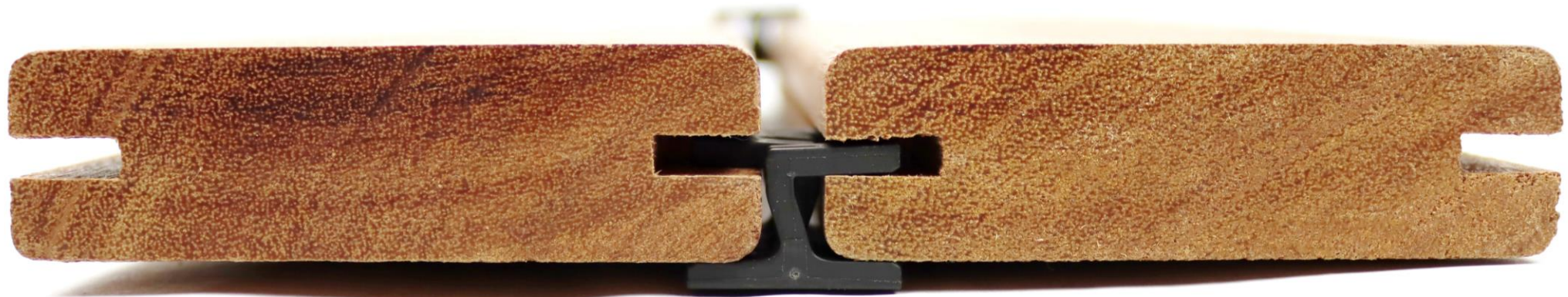
Design
Material
Features
Advantages

Nova USA Wood
EXODEK
QUICKCLIP



EXODEK QUICKCLIP

- Nova USA Wood has developed a new hidden deck designed for seasonal expansion of hardwoods
- There is NO other clip on the market that can achieve all the features that the ExoDek® QuickClip® can

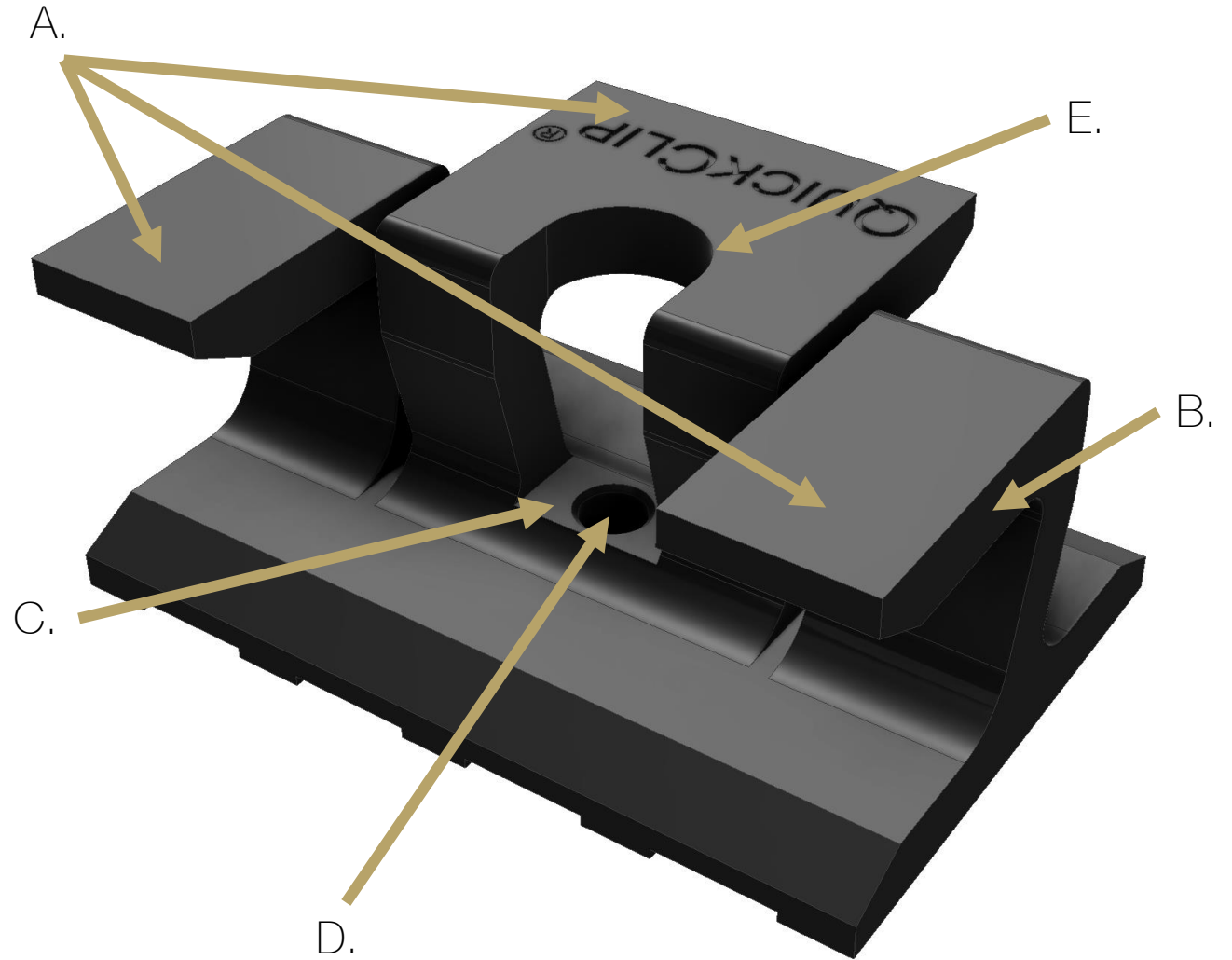


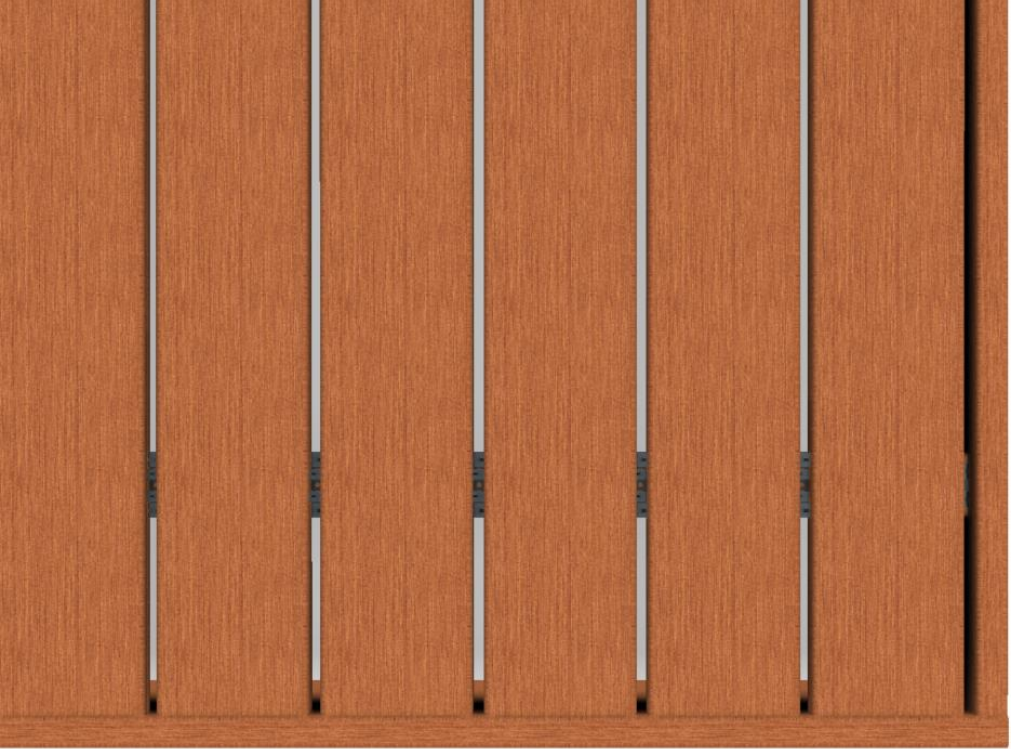
EXODEK QUICKCLIP

Advertised Use	Hardwoods, Softwoods, Composite, PVC
Material	Polyamide (Nylon) 66, 13% glass fiber reinforced
Board Spacing	1/4"
Installation Angle and Ability	90°, multiple row installation
Expansion Mechanics	Vertical flanges allow for horizontal expansion of the boards while maintaining consistent spacing and aesthetic. Upper wings maintain hold down force meaning no buckling boards.
Projected Price	\$0.68 per part

Features

- A. PowerWings to retain the deck boards at the board groove
- B. Flexible ballistic polymer for consistent hold down
- C. Reinforced fastener seat to help screw retention
- D. Direct 90° screw orientation to mitigate water entry and easier install
- E. Fastener guide hole to allow multiple row installation

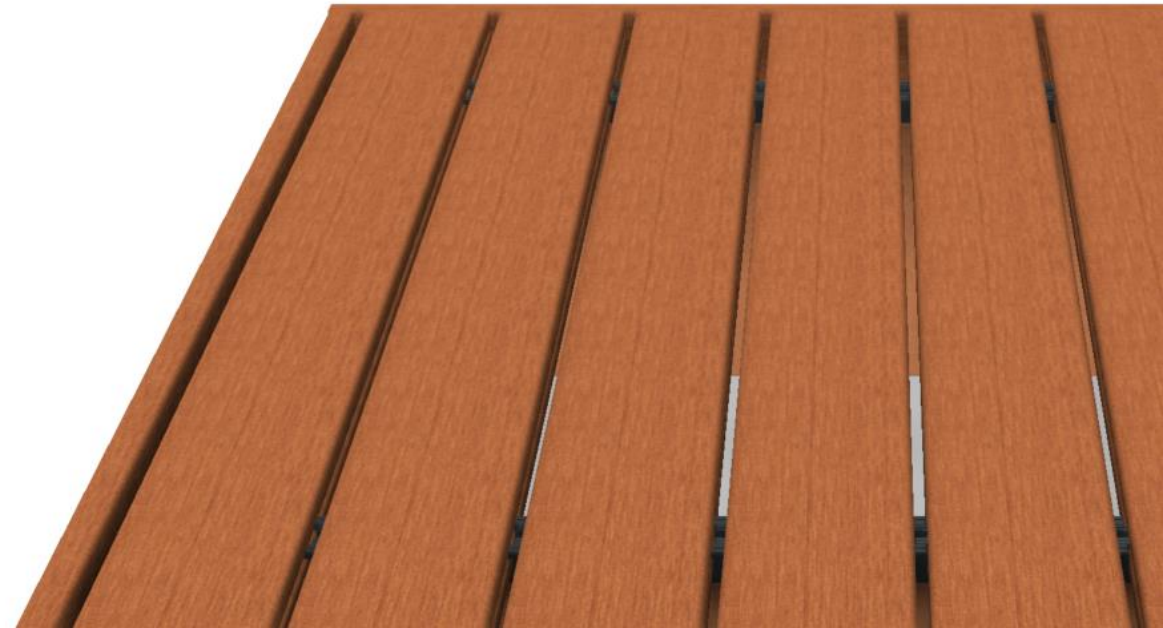




EXODEK

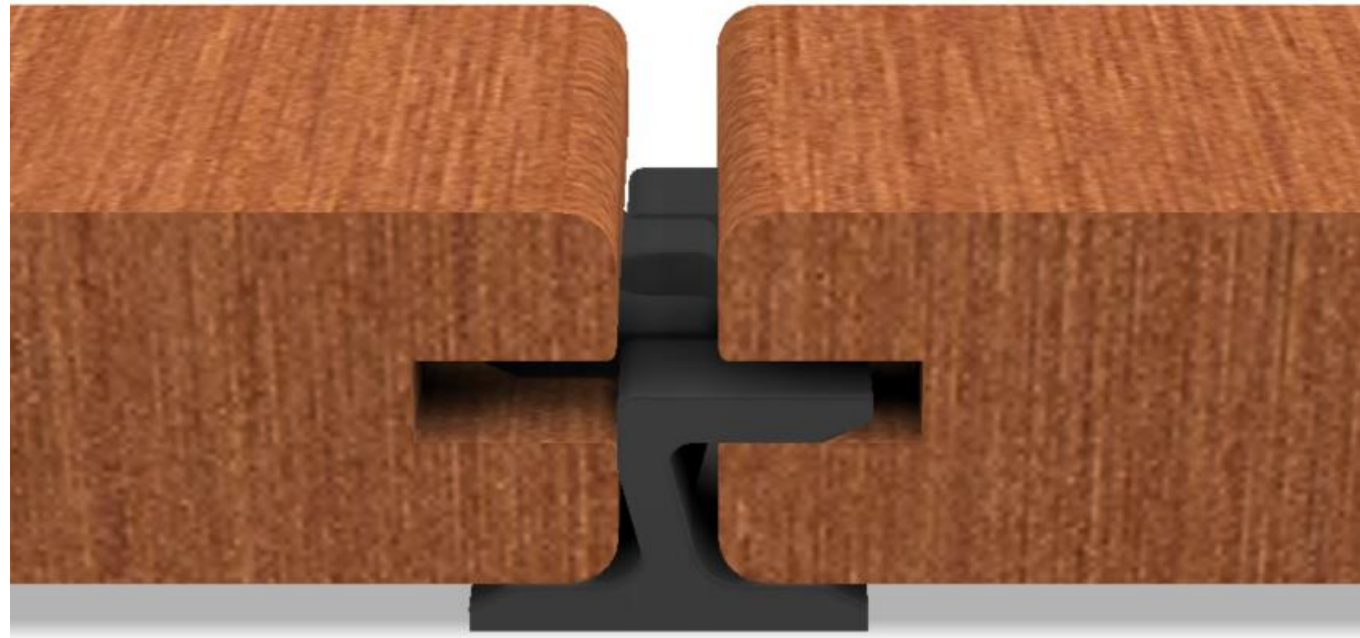
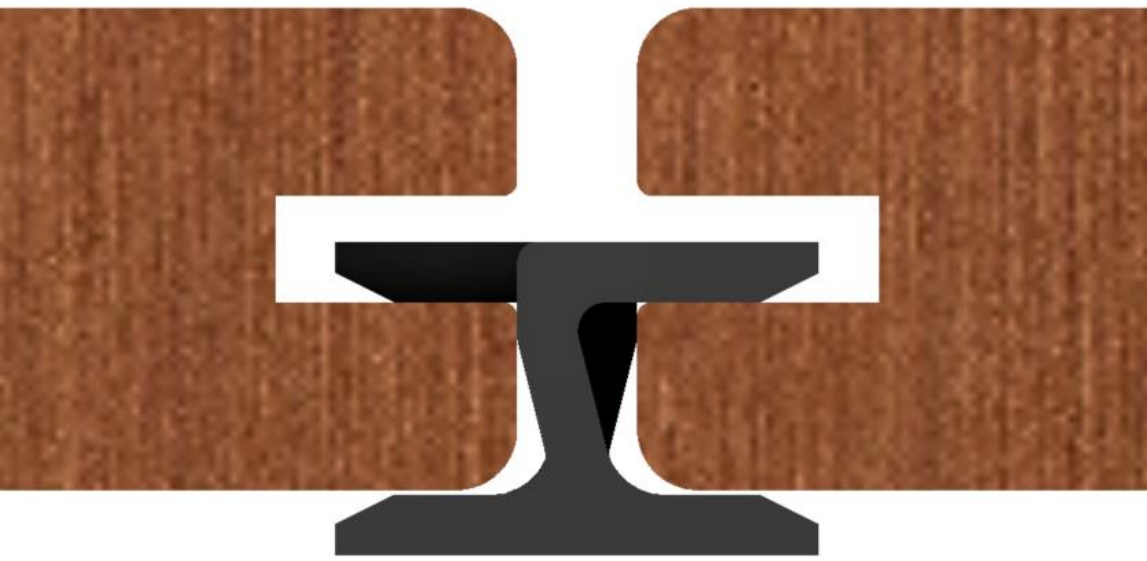
QUICKCLIP

- The ExoDek QuickClip allows for multiple row installation and fastens into the joist and holds onto the deck boards
- Achieves a beautiful, uniform look for every installation, every single time, quickly



EXODEK QUICKCLIP

The ExoDek QuickClip provides a perfect 1/4" spacing between your deck boards



EXODEK QUICKCLIP Advantages

- Direct fastening allows for
 - Multiple row installation (4-5 boards at a time!)
 - No need to drill through deck boards
 - Full expansion of boards is accommodated for
- Clip is virtually hidden
 - No visible screws or fasteners
- Clip will lift deck boards off joists to help drying and airflow
 - Increases longevity of deck boards by reducing mold and mildew
- Clips will automatically and consistently space the boards 1/4" apart
- Wings will move with the boards as they expand and contract
 - No more buckling!



Material: Nylon 6/6 (Polyamide 6/6)

- Injection-mold, 13% glass fiber reinforced heat-stabilized resin
- Economical production cost to help keep prices low for customers
- High abrasion resistance (resistance to wear down)
- Resistant to fatigue (can withstand repetitive movement for long periods of time without failure)
- High strength
- High dimensional stability
- Noise dampening (no squeak)

Physical Testing and Product Data

Both decades of experience in wood working, and real world testing is vital to ensuring the best product.

Designed to Resist **Maximum** Uplift Force
(Hurricane Conditions)



Designed to Resist **Maximum** Uplift Force (Hurricane Conditions)

$$F_w = 1/2 \times \rho \times v^2 \times A$$

$$P_d = F_w/A$$

$$**P_d = 1/2 \times \rho \times v^2**$$

F_w = wind force (N)

P_d = dynamic pressure (Pa)

A = surface area (m²)

ρ = density of air (kg/m³)

v = wind speed (m/s)

$$\rho = 1.225 \text{ kg/m}^3$$

$$v = 76 \text{ m/s}$$

$$P_d = 1/2 \times \rho \times v^2$$

$$P_d = 1/2 (1.225 \text{ kg/m}^3)(76 \text{ m/s})^2$$

$$P_d = 3537.8 \text{ Pa} = 0.513 \text{ psi}$$

$$**P_d = .513 \text{ pounds per square inch}**$$

Let's look at a worst-case scenario example:

- The maximum recommended joist span is 24" wide
- The maximum deck board width is 5 1/2"
- The maximum board length is 20 ft long (240")
- $240\text{in} \times 5.5\text{in} = 1,320 \text{ in}^2$ (this is the surface area)
- $0.513 \text{ lbf/in}^2 \times 1320 \text{ in}^2 = 677.16 \text{ lbf}$
- There will 11 clips spread across each side of the board for a total of 22 clips
- $677.16 \text{ lbf} / 22 \text{ clips} = 30.78 \text{ per clip}$

Example Continued

- In testing uplift, it was shown that the boards were breaking at the groove at about 200lbf before the clips showed any sign of weakness
- Each clip took on approximately 50 lbf of uplift force and showed no signs of damage or deformation
- When we compare that to our hurricane scenario where each clip needs to take on approximately 30 lbf, the clips are built for resilience!

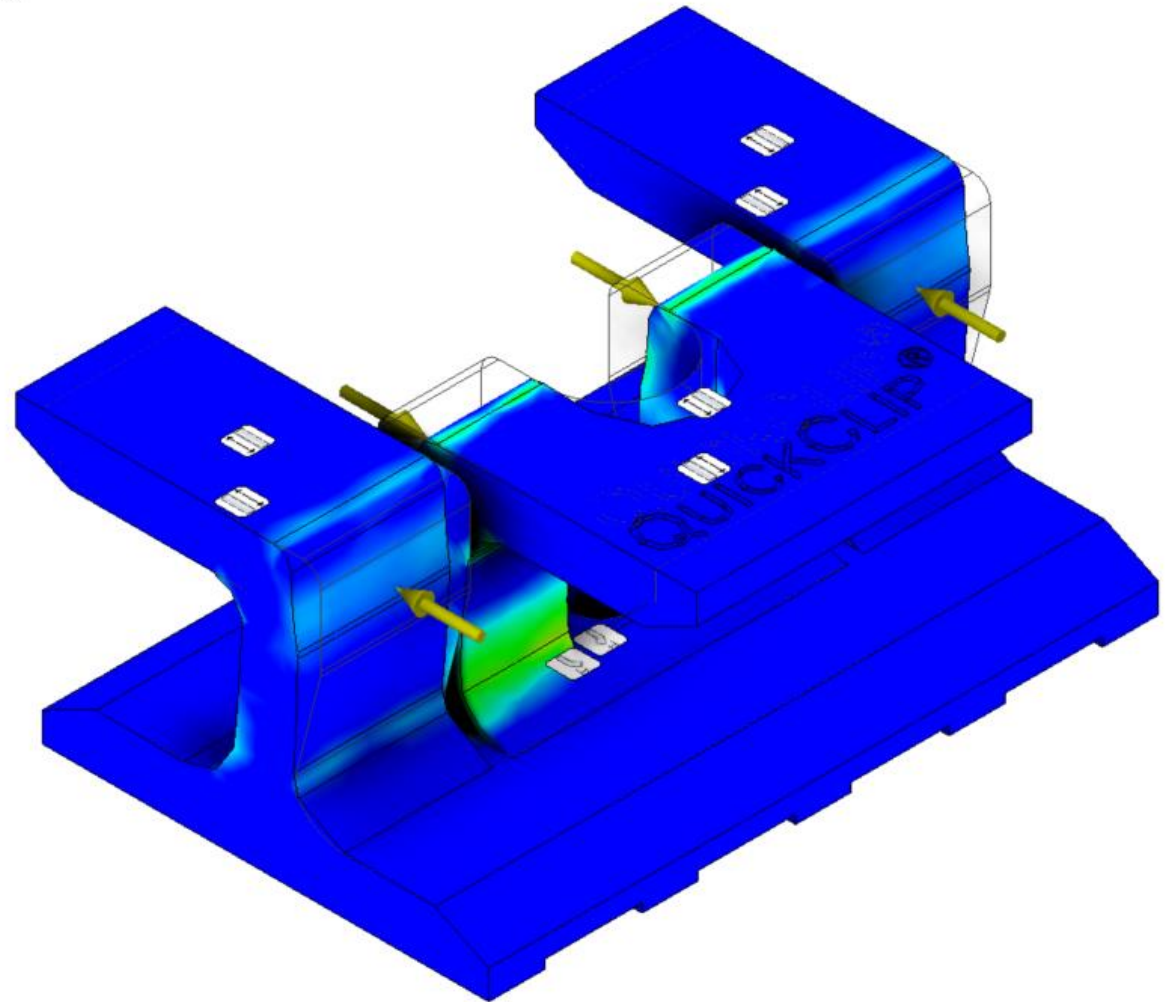
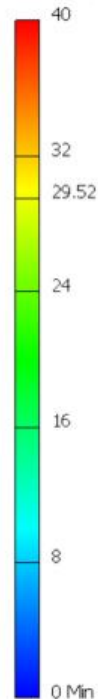
Photos of uplift testing



Designed for Seasonal Expansion

- Using finite element analysis software and years of wood knowledge, the clip was subject various magnitudes of force to replicate and exceed the mechanics it would experience in the real world

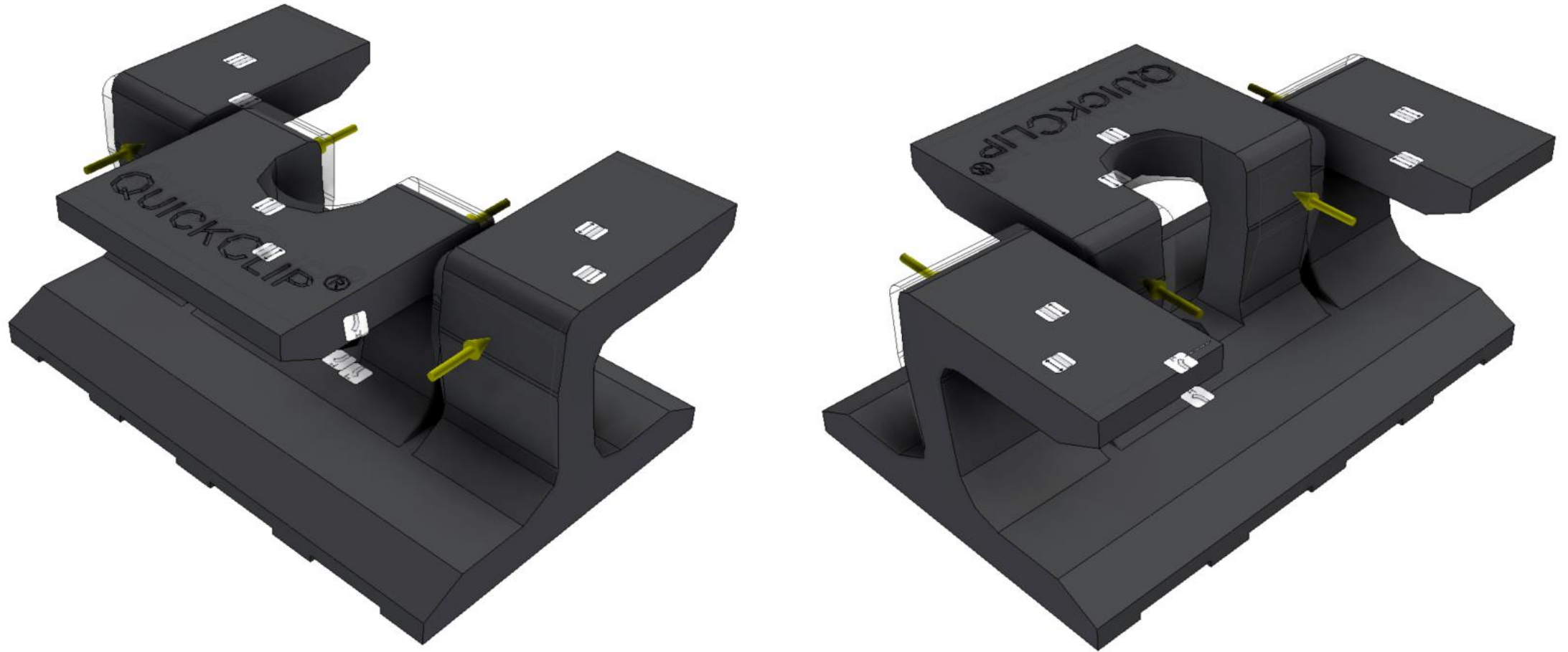
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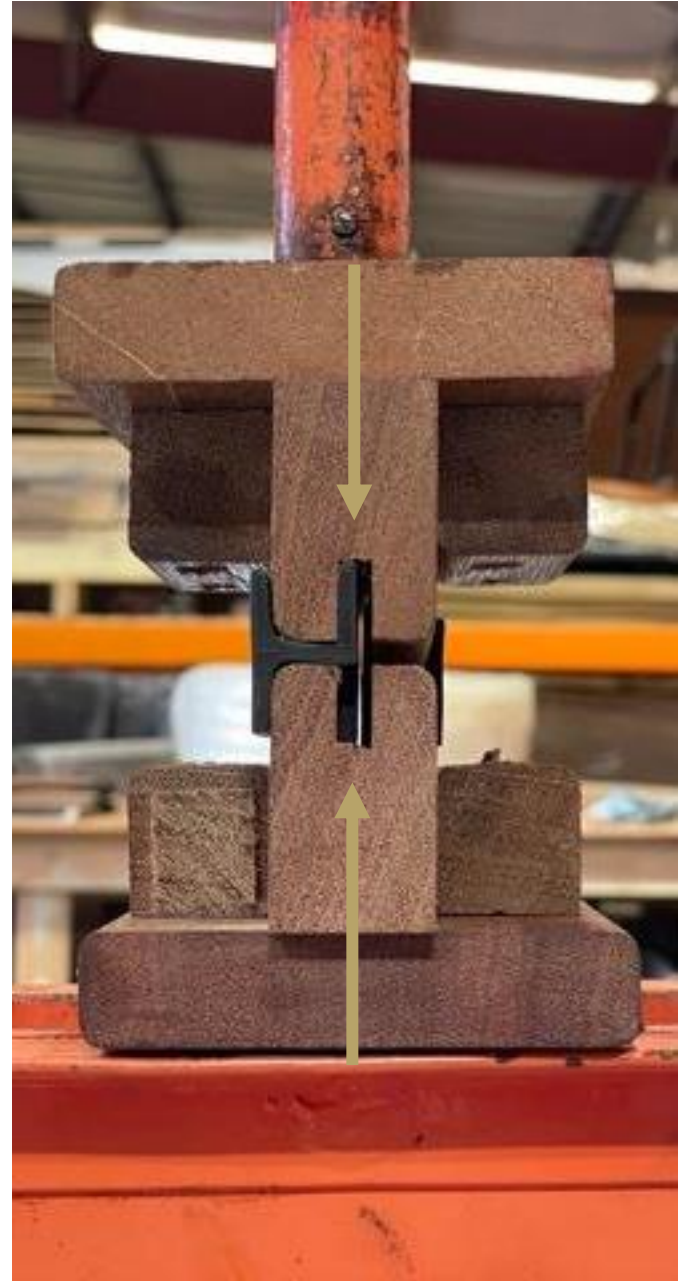
Designed for Seasonal Expansion

- The ExoDek QuickClip was subjected to testing in order to determine the force required to get to full compression. A single clip is predicted to require upwards of 500 lbs to get to its full compression point.
- After reaching full compression and then releasing, there was **no significant** decrease in the clips integrity.

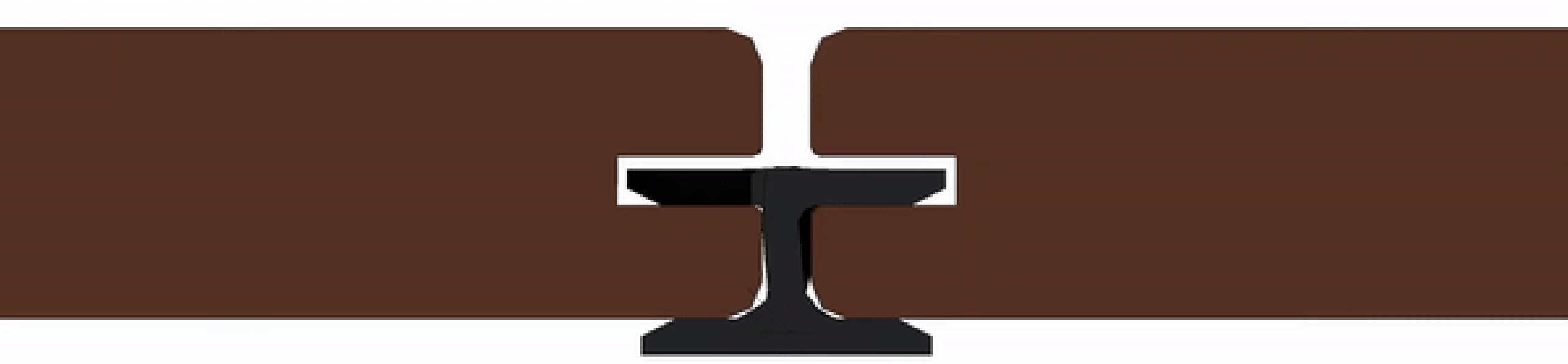
Designed for Seasonal Expansion



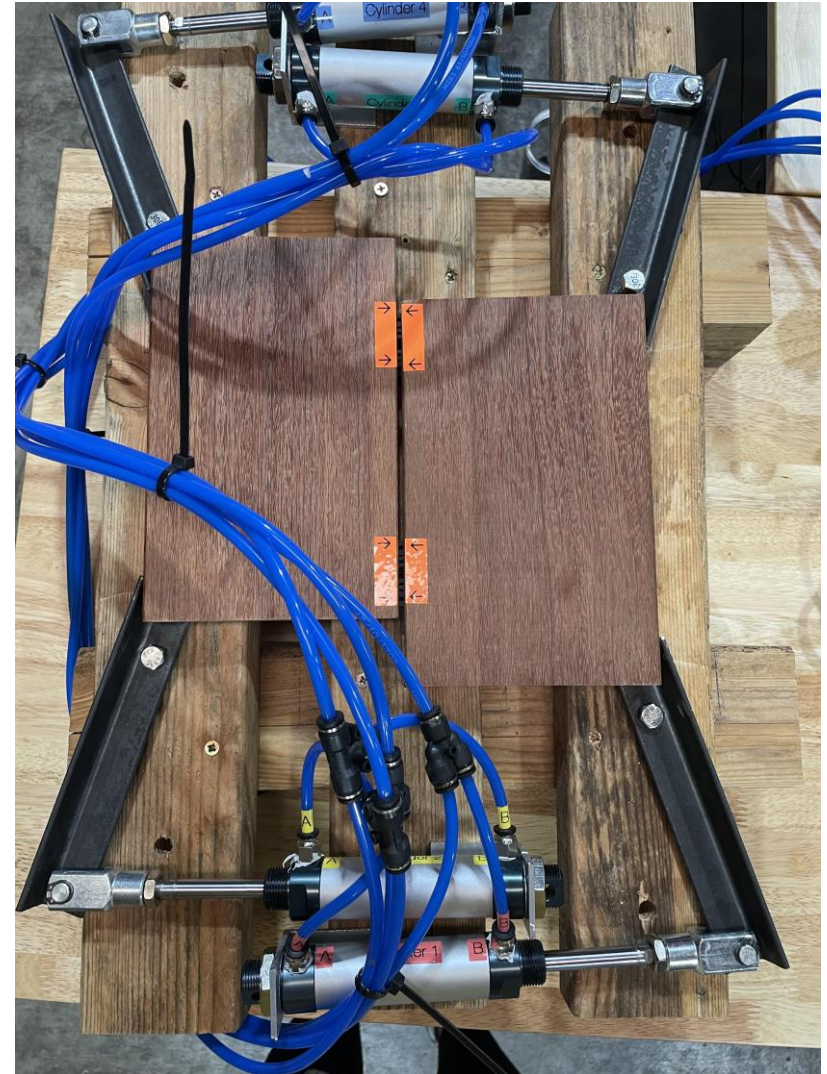
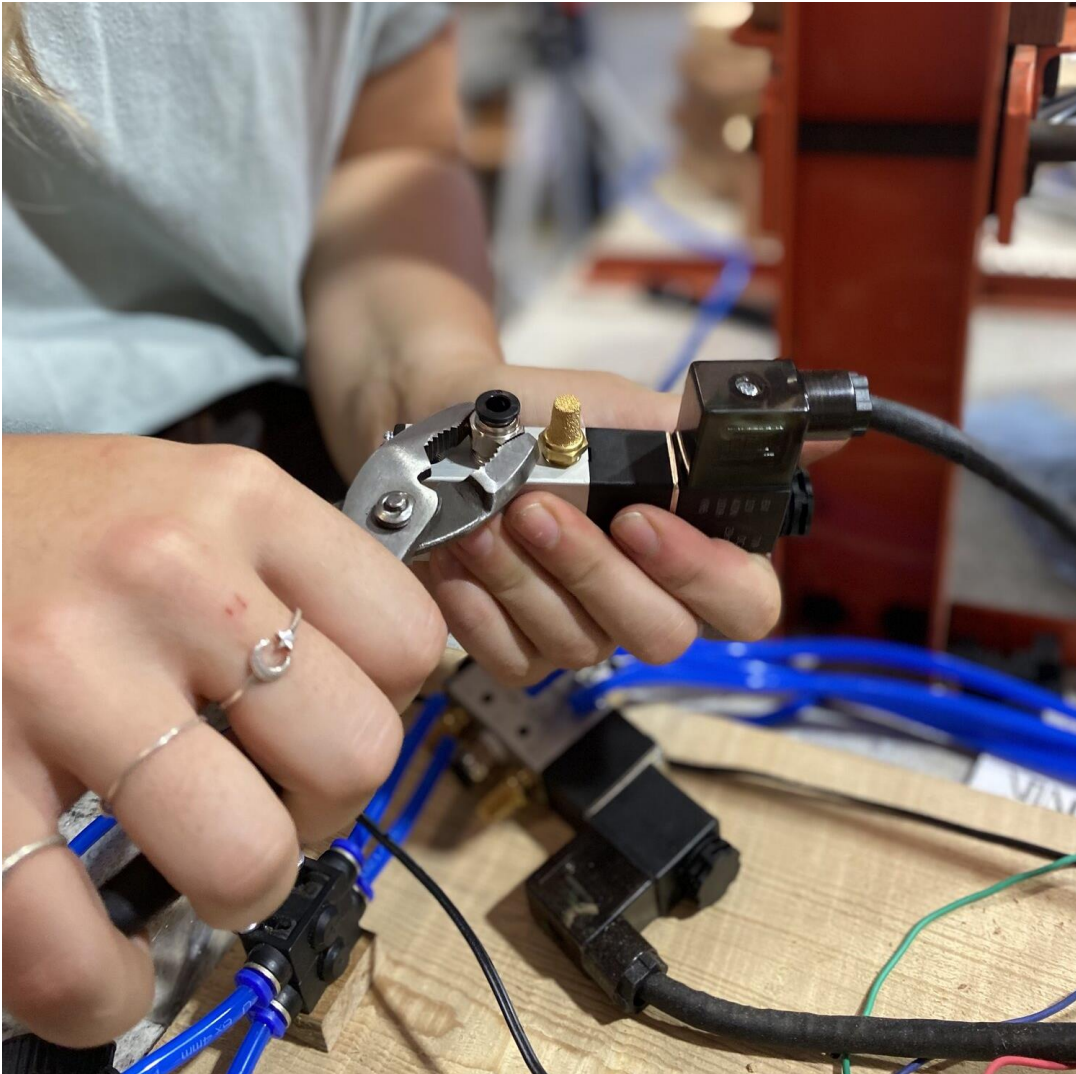
The final analysis resulted in the experienced stress being evenly distributed and under all design goals



Designed for Longevity with Repeated
Forces



Designed for Longevity with Repeated Forces



Designed for Longevity with Repeated Forces

- The clip underwent a test to ensure that long term repeated expansion and contraction of the deck boards wouldn't have a negative impact
- The clip was fastened down and two boards were put in place
- The machine was had 4 pneumatic cylinders to replicate the linear force of the wood expanding on the clip

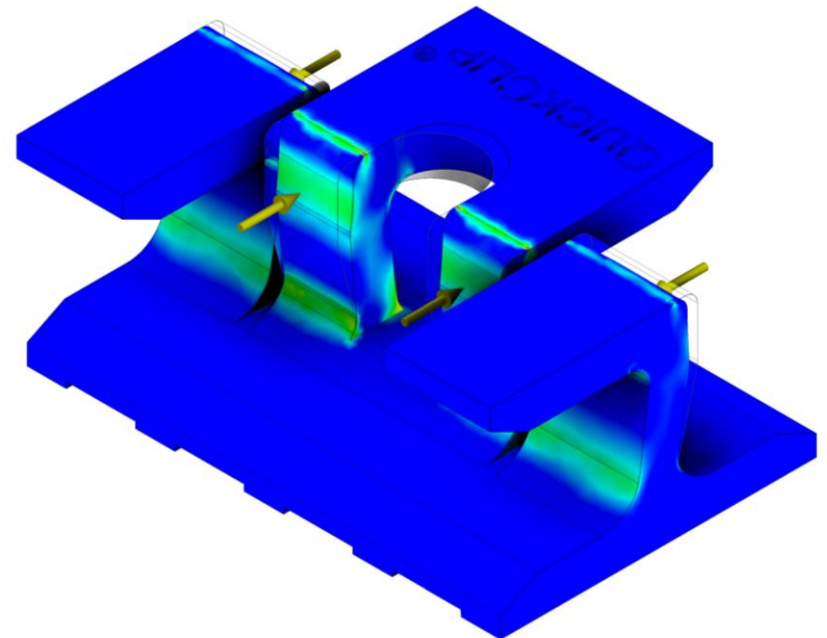
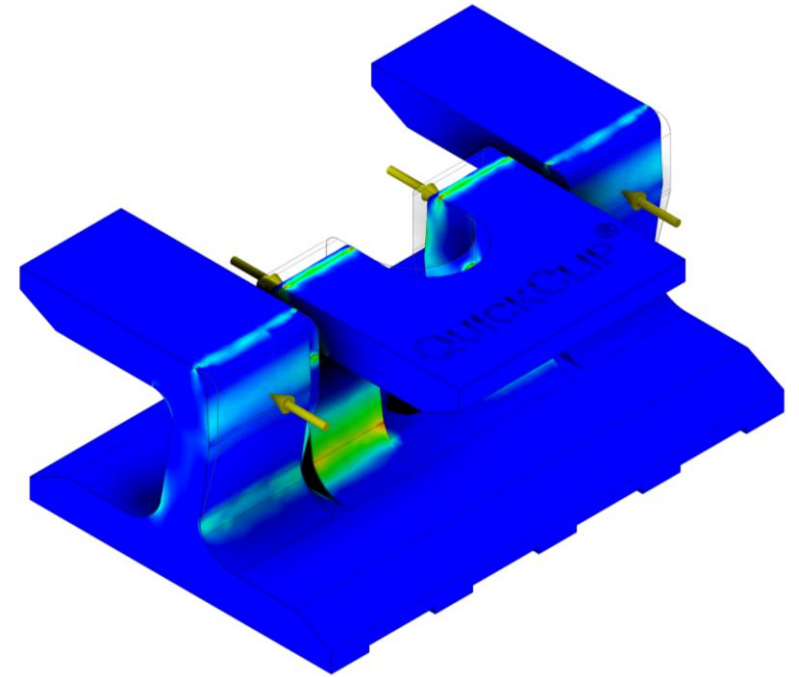
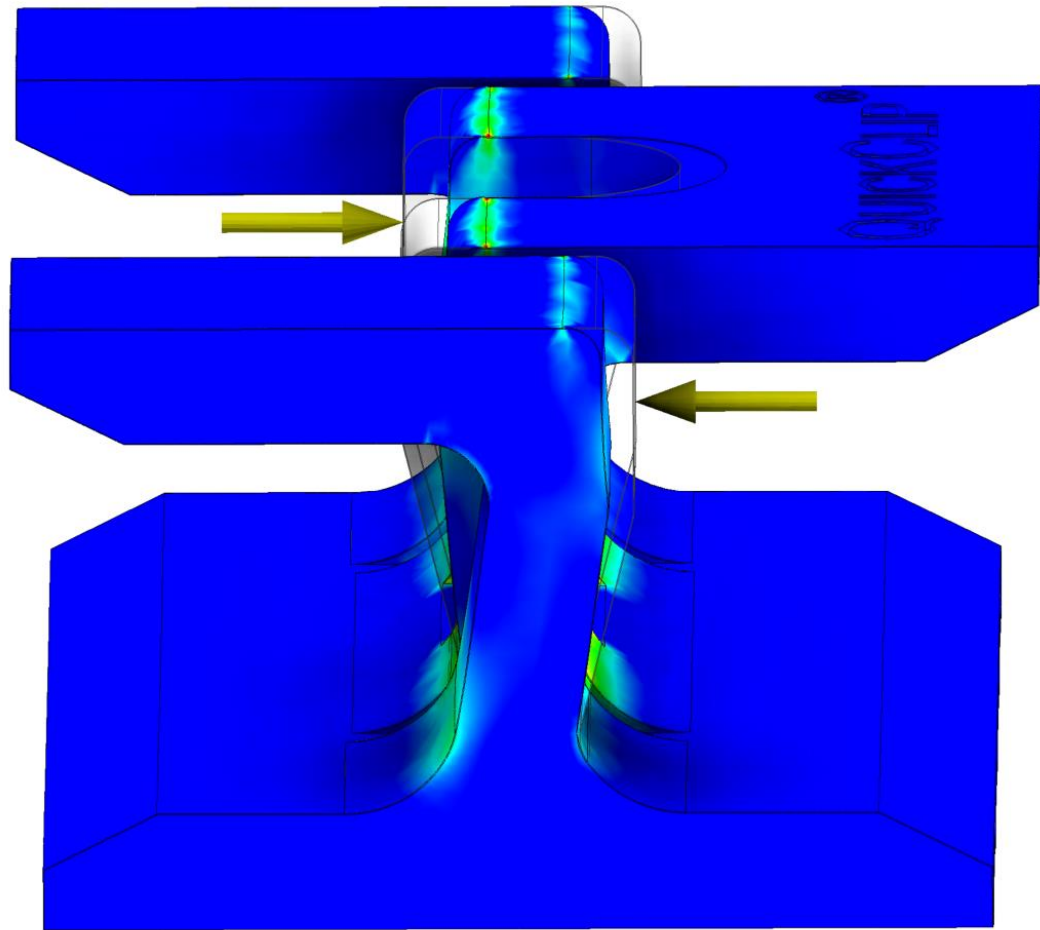
Designed for Longevity with Repeated Forces

- With the added lever arms, each piston was able to apply between 150 -175 lbf on the clip and board assembly
- With 4 cylinders, and 2 clips, the clip had about 320 lbf applied to it with each cycle
- The test ran for over 250 cycles and the clips suffered **no failures** or permanent deformations!

Summary

- In conclusion, the ExoDek QuickClip is:
 - Designed and tested for seasonal expansion
 - Designed and tested for longevity
 - Designed and tested to work WITH hardwood, not against it
 - Competitively priced
 - Easy to install
 - Made to make your hardwood deck even more BEAUTIFUL!

Stress Simulations Compression



Stress Simulations Uplift

