TimberTech® BY AZEK®

THE TECHNICAL RENAISSANCE OF SYNTHETIC DECKING

Modern high-end projects warrant a renewed analysis of TimberTech®

PUBLISHED 2024

INNOVATION HAS CHANGED THE CALCULUS

In the construction and home improvement industry, there has been a rising emphasis on outdoor spaces in luxury living. Even more so, architects and designers today are often tasked with creating a seamless flow from indoor spaces to outdoor experiences.

The challenge: To deliver an outdoor living area with as elevated a design as the interior, yet able to survive the elements.

Further burdening this effort is the fact that wood, with its natural warmth and beauty, has long been the standard for decking. Despite its timelessness, wood requires regular upkeep to prevent rotting and fading – even premium hardwoods like ipe, mahogany, and teak are vulnerable to the elements. For architects and designers, this means balancing the desire for the aesthetics of wood with the undesirable consequence of constant maintenance for their clients.

The alternative of composite decking became available decades ago. But while the performance benefits of early and subsequent synthetic products were superior to wood decking, the appearance fell short of the aesthetics of wood, thus failing to impress the discerning eye of luxury architects and designers.

Over the past few years, however, intense engineering and technical innovation have transformed the choices available in this space. Among the most successful, TimberTech® Composite Decking and TimberTech Advanced PVC Decking.

These TimberTech products represent a level of progress that has changed the calculus in outdoor decking. To fully embrace these developments, a brief timeline has been included below.

THE EVOLUTION OF SYNTHETIC DECKING

Upon introduction in the 1990s, composite decking products were “uncapped” with no protective outer layer. Because the boards were one solid material with no distinction between core and cap, the wood fibers in the composite mix were exposed to moisture, causing inevitable decay, mold growth, rotting and color fading. Also in these early generations, aesthetic appeal was severely limited.

Development of capping technologies in the early 2000s enhanced the protection of the wood-fiber component in composite decking, leading to improved fade resistance, durability and cleanability. Nonetheless, the appearance was still artificial with suboptimal fade resistance.

PVC-based synthetic decking was officially introduced in the 1990s. However, significant improvements were not realized until 2004 when manufacturers began utilizing solid foam PVC. Despite the absence of capping, solid foam PVC offered clear advantages over composite materials in preventing water damage such as rotting. Even with this progress, early products were hindered by uninspiring visuals and issues with color fading.

In 2009, advancements from AZEK in capping technologies led to improved aesthetics with better wood-like variegation. However, improvements did not fully meet the expectations of design-conscious consumers, and color degradation could occur.

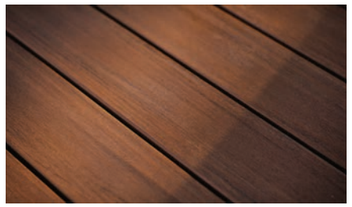
The merger between TimberTech and AZEK in 2012 marked a significant turning point, driving technological advancements, manufacturing innovations, and new product development. This was exemplified by the launch of TimberTech’s Vintage Collection in 2015, featuring Advanced PVC Decking with dramatically improved resistance to fading and authentic premium hardwood visuals.

Over the past decade, innovation continued to evolve across TimberTech’s two distinct product lines: the cost-effective Composite Decking and premium Advanced PVC Decking. Both lines benefit from the development of proprietary polymer capping technologies which enhance their durability and aesthetic appeal.

- TimberTech Composite Decking has a protective polymer cap that shields the composite core from moisture damage, while enabling wood-like aesthetics that are also fade and stain resistant.
- TimberTech Advanced PVC Decking utilizes premium polymer capping technology combined with a foam-like PVC core for superior fade resistance and superior fade, moisture, and rot resistance.

RESEARCH CONFIRMS 3 PRIORITIES FOR HIGH-END OUTDOOR SPACES

Conversations with luxury residential architects reveal three homeowner priorities for high-end decks:



PRIORITY 1

When specifying decking materials, **aesthetics** are the top consideration for both homeowners and architects. This is not surprising, as current criteria for outdoor spaces have become just as demanding as the scrutiny placed on indoor environments, specifically interior flooring options. In turn, luxury outdoor spaces are now considered an extension of the clients’ aspirational lifestyles.

PRIORITY 2

It’s clear that **durability and maintenance** play vitally important roles in decking material decisions. Clients not only want outdoor luxury, they want luxury that lasts for decades, made with a material that can withstand the elements and requires minimal maintenance.

PRIORITY 3

The use of **sustainable materials** has become an ever-bigger consideration in the minds of affluent homeowners, especially when architects and designers present them with aesthetically pleasing alternatives to real wood.

How does TimberTech address these three priorities?

The following sections of this white paper will detail how TimberTech’s innovations in the outdoor living space have significantly advanced both aesthetics and functionality, meeting the evolving needs of the architectural and design community.

Early, competitive products were uncapped and experienced rotting through the bottom. Coloring was a basic woodgrain.

Today’s TimberTech Advanced PVC is capped on all four sides. It has a less exaggerated woodgrain with a superior color blend.

PRIORITY 1A

MATERIAL AESTHETICS & CRITICAL REALISM

Our conversations confirmed that appearance – specifically look, touch and feel – is the most significant factor driving decking preference. Traditionally, a real wood deck, with its warmth, pleasing texture, and interesting and subtle color variations, is the standard.

That is why the proprietary polymer capping and unique color-blending processes employed by TimberTech hold such significance. These technologies, outcomes of intense research in material science, have enabled TimberTech to mirror the look of wood with extremely high accuracy.

Historically, synthetic decking sought to replicate a wood look by employing a base color, often a brown or tan, then adding detail with a heavy "black streaking" methodology. To the casual observer this created an intriguing appearance, but its aesthetic was "wood-adjacent" at best. Today's TimberTech approach is significantly evolved, delivering an authentic look that is more matte in finish than previous options or competitive brands.

A

B

Color blending

While proprietary, TimberTech employs multiple colors to achieve the tonal depth, subtle undertones, and natural variations of real wood. The visible cap receives a unique color-blending treatment. Importantly, there is none of the exaggerated black streaking or overly deep woodgrains that belie many synthetics.

Color cascading

To advance color sophistication further, TimberTech has introduced a color-cascading technique. This process – again, proprietary – employs computer-controlled metering of different, lifelike colors to deliver the nuanced aesthetic that results from the multifaceted interplay of weathering, color transformation from oxidation, and varying distribution of pigments that occur naturally as wood ages.

C

D

Variable embossed woodgrain

TimberTech employs innovative embossing techniques to deliver a realistic, linear woodgrain pattern. This eliminates the repetitive patterns that are a dead giveaway of a lesser synthetic. Instead, the eye accepts TimberTech as fully natural in appearance.

With these capping advancements, architects and designers are now able to accurately match the look of many wood species that are often specified, including tropical hardwoods, softer woods that have been stained or painted, and salvaged woods.

In sum, capping technology is crucial as it conceals the core, which does not need to be visually appealing, thus allowing it to focus solely on providing durable, long-lasting performance. Beyond that, TimberTech has focused on the core to continuously improve the amount of blended recycled materials in its decking products. TimberTech Composite materials feature up to 85% recycled content in cap and core, while the Advanced PVC line uses up to 60% recycled PVC exclusively in the core. This approach keeps waste out of landfills and helps reduce the use of virgin, fossil-derived plastics.

A English Walnut® from the TimberTech Advanced PVC Vintage Collection®

B Tigerwood from the TimberTech Composite Legacy Collection

C American Walnut® from the TimberTech Advanced PVC Landmark Collection®

D Coastline® from the TimberTech Advanced PVC Vintage Collection®

SEE FOR YOURSELF

Order material samples.

PRIORITY 1B

MATERIAL AESTHETICS & DESIGN EMPOWERMENT

When concepting outdoor living spaces in the past, architects and designers have faced a litany of product limitations: material and site constraints, weather tolerance, safety standards, aesthetic compatibility, budget friction and more. While these limitations persist, the mandate to delight the client has not changed.

Fortunately, the innovations seen in TimberTech decking have virtually erased these limitations thanks to a diverse portfolio of profiles. Consider these specific examples of design empowerment:

Complete moisture to water

TimberTech Advanced PVC is manufactured to be complete moisture to water. This enables the installation of stairs or skirting to be in direct contact with the ground, masonry and vegetation without rot, mold or mildew risk. For the same reasons, Advanced PVC is highly applicable to poolside decks or docks – a frequent challenge in the luxury home echelon. The core of TimberTech Composite contains some wood fibers, but with all four sides capped, it too is sealed from moisture.

No-gap flooring

In certain high-end applications (ex: a covered southern-style porch), architects and designers might need to specify a floor without gaps. For these design opportunities, TimberTech offers porch boards that feature a tongue-and-groove profile. With tight joints, this empowers the creation of an authentic porch that will not need sealing or staining.

Multi-width options

TimberTech Advanced PVC offers multi-width boards that are available in narrow (3.5”), standard (5.5”), or wide (7.25”). This enables architects and designers to expand the wide-width interior flooring trend to the outdoors. Mixing and matching of widths is also a creative option, further broadening the creative palette.

HOW FLOORING LED TO COLLECTIONS

TimberTech developers note that collections like the ones seen here were inspired by a key design choice from inside the home: interior flooring. TimberTech collections aim to replicate the natural allure of wood, while offering architects and designers a versatile toolkit to achieve design trends. Design empowerment is achieved through collections with a specific woodgrain, available in multiple complementary colors – enabling professionals to seamlessly mix and match for their project.

Vintage Collection®

Nuanced color blend with highlights and lowlights with refined, subtle grain for a premium hardwood look.

Landmark Collection™

Multi-tonal color cascading for a high level of variation, complemented with crosscut grain for a reclaimed wood look.

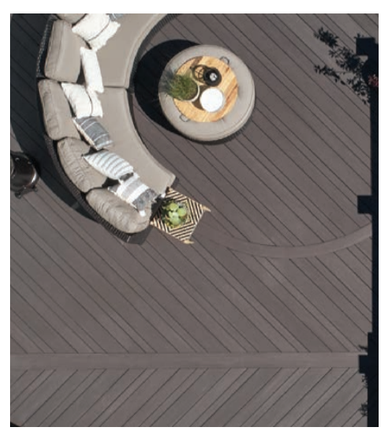
As architects and designers have expertise in delivering certain looks, TimberTech has designed and engineered multiple collections (see center panel). These collections embrace their own grain patterns and finishes, specific to design needs and client desires, that rise to the level of authenticity now demanded by luxury homeowners.

The ability to track and deliver trends is labor-intensive. TimberTech designers monitor trends from global media, trade shows, and the indoor flooring world, specifically from Western Europe, to ensure collections that pace modern expectations. Wide planks and multi-color flooring are two of the trends to emerge from those sources.

Another design option unique to TimberTech Advanced PVC is heat bending (see below). This process involves heating the boards to high temperatures, then bending them into curved shapes. With this technique, it is now possible to execute curved stairways or follow landscaping borders. By comparison, heat bending with wood is highly complex, expensive, and cumbersome – and it’s not even possible with composites.

That said, there are other benefits unique to TimberTech Composite. By design, this is a heavier board, conveying a sense of sturdiness underfoot that mimics hardwood – a tactile sensation that some clients prefer.

As a result, the overall design flexibility of the TimberTech portfolio is notable. While architects and designers embrace TimberTech for its realism, creative empowerment is moving it well beyond the limitations of lumber.



PRIORITY 2A

DURABILITY IN CHALLENGING TIMES

A deck's long-term performance is directly related to the material used. The advanced material science employed in TimberTech Advanced PVC Decking creates superior longevity and is backed by a Limited Lifetime Product Warranty. Its colors is backed equally with a 50-year Limited Fade & Stain Warranty. Meanwhile, TimberTech Composite is supported by parallel warranties of up to 30 years.

Beyond the warranties, however, the benefits of this material extend to a far more pressing issue: a far more pressing issue: wildfires.

Many of the prime geographies for luxury homes are in the most vulnerable locations. West Coast and mountain regions suffer from wildfire risk, while sought-after coastal locations face frequent storms and winds that increase saltwater intrusion.

First, wildfires. This is an area of heightened concern among designers and architects who serve in fire-prone areas, and material choice has taken on an entirely new level of scrutiny. TimberTech Advanced PVC is the leader in this spec, as the first to earn a designation of Ignition Resistant.

An Ignition-Resistant designation is significant. It is the second highest level of recognition next to non-combustible materials. Ignition resistance is determined when a flame or ember first touches a material; those materials earning the designation resist catching fire or burning easily, thus slowing the spread of flames.

Advanced PVC Vintage and Landmark Collections have a Class A Flame Spread Rating (best in class), making them the optimal decking choice for fire zones. Class A Flame Spread Rating materials resist catching fire from flying embers, burn at a slower rate, and are unlikely to contribute to aggressive flame spread. For comparison, most untreated natural wood products have a Class C Flame Spread Rating.

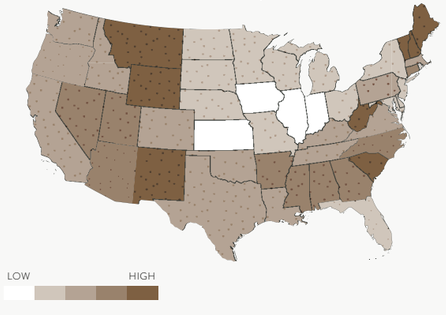
Finally, Advanced PVC meets Wildland Urban Interface (WUI) standards. WUI zones occur where homes border land that is prone to wildfires, with a high risk of fires jumping to structures. More than 60,000 communities in the U.S. are at risk for wildfires using this standard. As a result, building codes in these zones mandate that materials for construction projects, including decks, meet WUI regulations.

Next, coastal storms represent an entirely different challenge, but one that TimberTech Advanced PVC meets notably well. As a fully non-organic decking board, it is resistant to damaging effects from rain or saltwater.

It should be mentioned that architects and designers are receiving demands for "hardened houses" via both homeowner requests and building codes. TimberTech Advanced PVC meets these demands.

WUI RISK

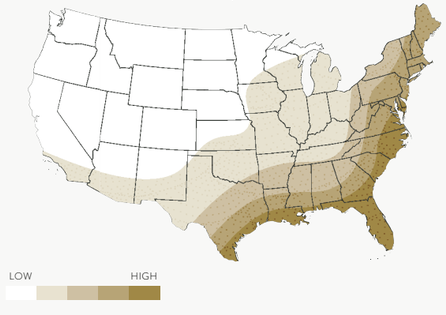
Density of houses in the WUI relative to total houses by state



USDA Forest Service. "Understanding the Wildlife Urban Interface (1990-2020)." September 20, 2023. Available at: https://storymaps.arcgis.com

NOAA RISK

Hurricane and severe storm risk by state



FEMA. "The National Risk Index." Available at https://hazards.fema.gov/nri/hurricane.

LUXURY DECKING

PRIORITY 2B

MAINTENANCE REVEALS A CLEAR CONTRAST

Wooden residential decks have been the standard for decades, and over that period, the limitations of wood have been made clear. Wood is an organic material, and is highly vulnerable to the elements. Over time, it will deteriorate from water absorption, UV rays, and freeze/thaw cycles.

While the water damage threat to wood is obvious and severe, the issue also extends to composite products that utilize organic wood fibers. TimberTech Advanced PVC offers superior protection against water damage, being both rot and mold resistant. TimberTech Composite products feature polymer caps with no wood fibers that are susceptible to damage. In contrast, some manufacturers have adopted cost-cutting measures, capping only three sides and incorporating wood fibers in the cap. This design leaves the composite more vulnerable to water exposure and potential deterioration.

A continual challenge with wood decking and some competitive synthetics is color-fading. In fact, fading becomes particularly important to architects and designers when faced with overhangs, partial walls, or other objects that cast shadows on decks. This can lead to inconsistent coloring and fading without steady maintenance.

Another concern for many clients is heat absorption, especially in pool surrounds and full-sun applications. The material content of TimberTech Advanced PVC is less dense, thus absorbing and retaining less heat. As a result, Advanced PVC will stay up to 30 degrees cooler in the sun than competitive composite products in the same color space.

Every year or two, all wood decks (ipe included) need a fresh coat of sealer or stain to protect them from fading, splinters, mold, and rot. Before applying a new seal coat, any existing sealer must be removed.

By contrast, TimberTech decking does not need sealing or staining. Its proprietary capped-polymer technology provides rigorous protection from the sun and the elements, safeguarding deck boards from fading, mold, mildew, and moisture damage. Simple maintenance with recommended deck cleaners, explained here, will secure the aesthetic appeal: https://www.timbertech.com/resources/care-cleaning/

Weathered ipe wood after 6 months

Weathered mahogany wood after 6 months

Weathered TimberTech Advanced PVC after 6 months

TimberTech only requires a periodic clean and rinse

Based on internal testing.

PRIORITY 3A

SUSTAINABILITY, AND FULL-CIRCLE RECYCLING

While architects and designers clearly state that sustainable products matter to homeowners, it comes with an obligation to meet their aesthetic and durability needs as well. TimberTech is unique in the industry in that it performs in all these respects.

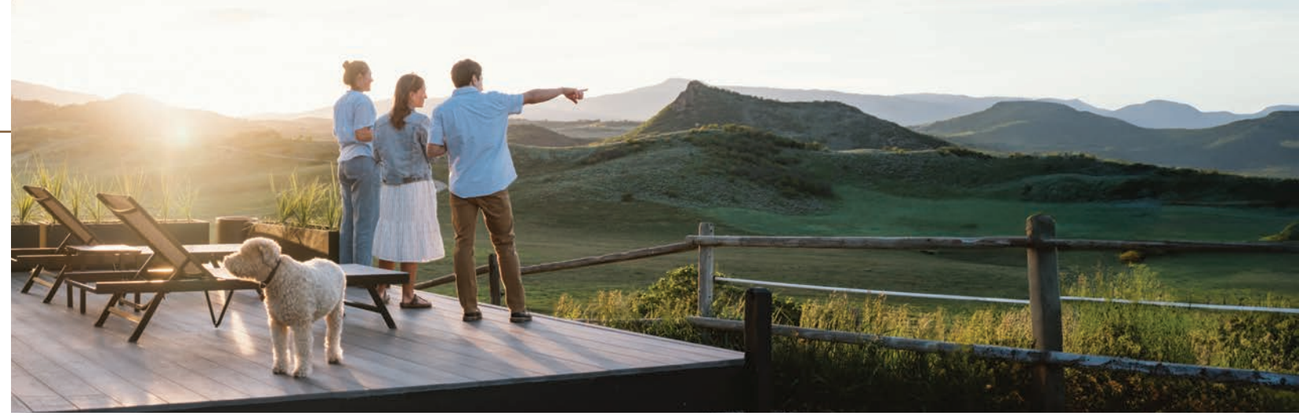
TimberTech Composite Decking is manufactured with up to 85% recycled material including plastic bags, milk jugs, and other discarded plastics. The outcome is less plastic waste in landfills, and a highly sustainable decking material.

Meanwhile, TimberTech Advanced PVC starts with up to 60% recycled content among its source materials. These include post-consumer and post-construction PVC scrap such as pipe, vinyl siding, and window trim. Once considered to be an unrecyclable plastic, technology has closed the gap and made PVC a recycling mainstay.

AZEK, the parent company of TimberTech, pioneered an efficient way to recycle PVC in the manufacture of decking. In fact, AZEK is now the largest vertically integrated recycler of PVC in the country. Millions of pounds of discarded PVC are diverted annually from landfills to make TimberTech products. In 2020, AZEK launched a novel PVC collection program. By providing special bins at job sites and dealer locations for scraps and cutoffs, AZEK has created a new end-market for post-construction PVC waste.

At the end of functional life, TimberTech Advanced PVC can itself be recycled. As a completely non-organic material, the decking can be transformed into new products which will yield another 50-year lifespan. Termed the AZEK FULL-CIRCLE® PVC Recycling® Program, it establishes a unique model in the industry.

AZEK FULL-CIRCLE PVC RECYCLING



PRIORITY 3B

SUSTAINABILITY, AND A LOW LIFE CYCLE ASSESSMENT

Because the largest raw material in TimberTech Advanced PVC is recycled scrap and waste, it has a lower life cycle impact on the environment than traditional pine decking. Even more pronounced than pine is the TimberTech life cycle advantage when measured against ipe.

Factoring in overall environmental impact, TimberTech Advanced PVC and TimberTech Composite outperform ipe by a wide margin. In a recent peer-reviewed Life Cycle Assessment (LCA) study, TimberTech was found to have an 89% lower life cycle carbon footprint than ipe, based on its 100-year total Global Warming Potential (GWP). Put another way, ipe's lifetime carbon emissions (10,774 Kg CO2e) are nearly ten times larger than TimberTech's (1,170 Kg CO2e). The study also showed that the more recycled PVC TimberTech uses, the lower its carbon footprint becomes.

The main reasons for the difference: Ipe is made from trees that, once harvested, take nearly a century to regrow. The high demand for ipe (76% growth between 2010 and 2020) has led to less-regulated and unsustainable harvesting operations. Additionally, ipe has to be transported nearly 8,000 miles from Brazil to the U.S.

The demand for ipe wood also contributes to deforestation. Mature trees are spread thinly – only one in every 7 to 25 acres of rainforest. Getting to these mature trees requires the clearing out of countless other trees for roads and harvesting equipment. The result: timber is wasted, natural habitats are destroyed, and carbon reserves are lost.

In the simplest of terms, TimberTech is more sustainable than wood, and markedly more sustainable than ipe.

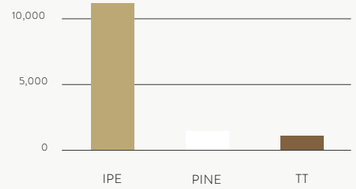
SCAN TO LEARN MORE

View our full ESG report to learn more about our sustainability practices.

LIFE CYCLE CARBON FOOTPRINT

IPE's lifetime carbon emissions are nearly ten times larger than TimberTech's.

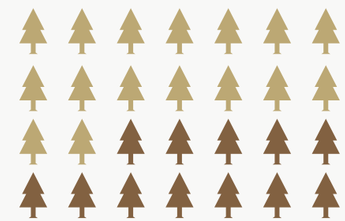
(Measured in Kg of CO2e)



AZEK. "2022 ESG Report." p. 29.

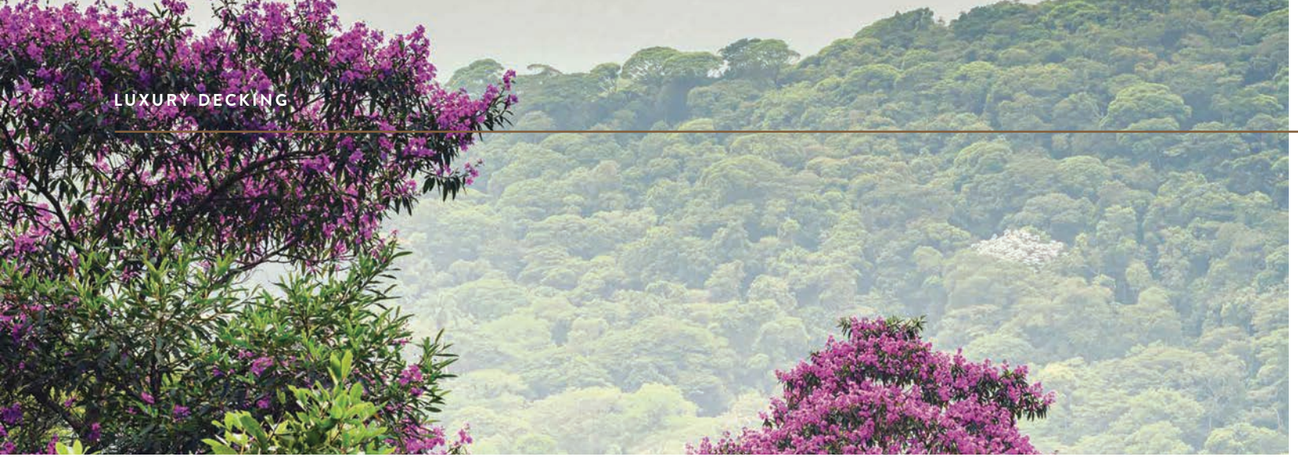
DEMAND FOR IPE

IPE demand has grown 76% since 2010 which has led to less-regulated and unsustainable harvesting operations.



DEMAND IN 2010 ADDITIONAL DEMAND IN 2020

Forest Trends. "Forest Policy Trade and Finance Initiative." March, 2022. Available at: https://www.forest-trends.org



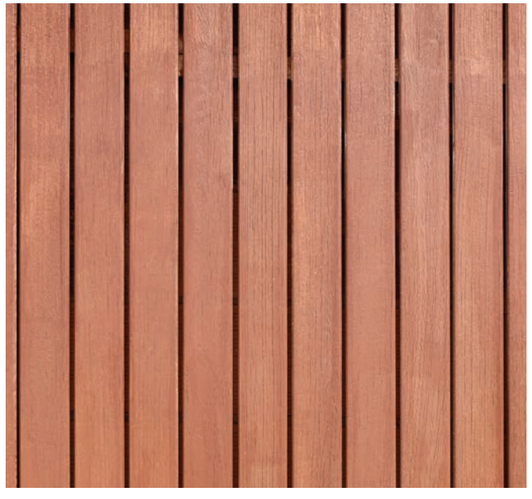
THE CHANGING PERSPECTIVE TOWARD IPE

It has been well-established that premium hardwoods like ipe and mahogany offer the perception of luxury. Ipe is prized for its beautiful brown and amber tones. It's extremely hard and strong. Because it's so dense, it outlasts other wood options in decking applications.

But beyond the environmental concerns detailed earlier, ipe has quite a few drawbacks. Unlike TimberTech, which is warranted to be both stain and fade resistant, ipe's color fades over time. While some homeowners actually desire its weathered silver tone, sun exposure can also cause shade lines – stark, irreparable differences in color where parts of the deck have been in shadow and others in light.

Ipe is also difficult to work with. Installers have found that when they don't pre-drill every fastener, ipe has a tendency to crack. Because ipe is such a dense wood, its boards are extremely heavy – up to 30% heavier than TimberTech Advanced PVC boards – which makes transporting them on the job site demanding, and could even add labor costs. And because ipe is exceptionally hard, cutting it can require carbide- or diamond-tipped saw blades.

Ipe's desirable aesthetics also come at a high cost for upkeep. If an ipe deck is not maintained, its durability is compromised, leading to moisture damage, checking, cupping and splintering. To avoid damage, ipe requires regular sealing and staining at a significant cost and time investment. Also, note that sealers and stains used to protect ipe – and all wood decking – may release volatile organic compounds (VOCs) into the air, which can cause adverse health and environmental effects.



Ipe wood when installed and stained

Weathered ipe wood after 1-2 years

A COMPARISON: TIMBERTECH, IPE & UPSCALE WOODS

Upon close examination, TimberTech products are almost indistinguishable from actual wood. Advances in material science have made this possible, utilizing methods such as multi-tonal color blending, tight grain patterns, and wire-brushed, low-gloss finishes.

Wood Oiled Ipe **TimberTech** Mahogany

Wood Weathered Ipe after 5 years **TimberTech** Coastline

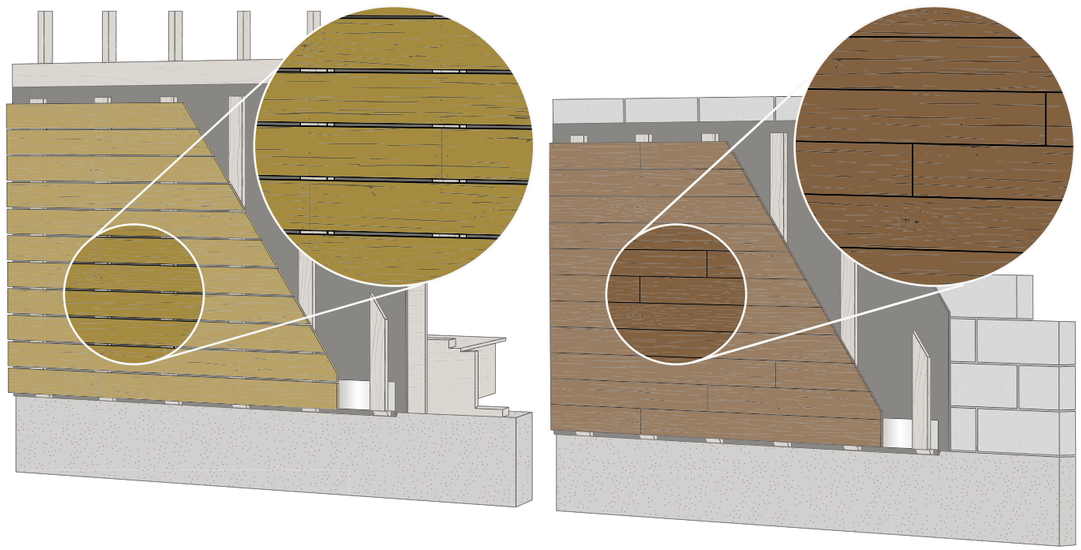
Can you tell which two are wood?

From left to right: English Walnut from the TimberTech Advanced PVC Vintage Collection,® mahogany wood, Mahogany from the TimberTech Advanced PVC Vintage Collection,® stained ipe

BROADER APPLICATIONS IN CLADDING

As established earlier, architects and designers are often tasked with connecting indoor spaces to luxurious outdoor environments. This connectivity can now extend to the home's exterior, as TimberTech® Advanced PVC Cladding has gained rapid acceptance as a cladding and trim material on upscale residences. As with TimberTech Advanced PVC Decking, this cladding solution shares a commitment to high-level, wood-matching aesthetics. Functionally, it is a longer-lasting, more durable alternative to other cladding materials, with resistance to moisture, rot, and fade among its strengths.

Beyond functional superiority, TimberTech Advanced PVC Cladding extends design empowerment to vertical exteriors. Architects and designers can employ either open-joint or closed-joint construction techniques; both complete a highly effective and attractive rainscreen exterior. The functional and aesthetic rationale behind each is detailed here.



Open-joint cladding

Aesthetically, open-joint design employs TimberTech Advanced PVC square shoulder boards. This creates a strong, linear design pattern for builders seeking a clean, minimalist, urban ethic. Also to that end, TimberTech's three board widths add to the palette of design possibilities.

Structurally, a waterproof member, rainscreen or barrier. is first attached to the building. Furring strips are secured over this barrier. Then TimberTech Advanced PVC square shoulder boards are fastened to the strips, with air space in between and gaps (open joints) between each board. These fully capped boards – front, back and sides – are completely rot-resistant and absorb virtually no water, so rain can run out (and air can circulate) behind the cladding without issue.

Closed-joint cladding

The closed-joint method features TimberTech Advanced PVC tongue-and-groove boards, delivering a sleek, uniform aesthetic. The boards are available in two widths to provide additional design options.

From a structural standpoint, construction is similar to the open-joint approach: waterproof barrier over the structure, furring strips next, then the TimberTech boards. Since these tongue-and-groove boards nest together to form a solid surface, ventilation openings are installed strategically at the top and bottom of the system to allow air to flow through the cavity, aiding evaporation. Again, because TimberTech tongue-and-groove boards are fully capped, moisture, fade and rot concerns are virtually eliminated.

EXECUTIVE SUMMARY

In luxury living, outdoor spaces are essential, requiring seamless integration with interior design. Architects and designers must deliver outdoor areas with elevated aesthetics that can also endure the elements. Wood has traditionally been the go-to decking material, but its maintenance needs and susceptibility to decay are clear drawbacks.

Recent years have witnessed a decking material renaissance, notably with TimberTech Composite Decking and TimberTech Advanced PVC Decking. These innovative brands address key homeowner priorities: aesthetics, durability/maintenance, and sustainability.

Intense material engineering has enabled TimberTech to overcome the limitations of early generation synthetic decking. Its proprietary polymer capping process duplicates the appearance of wood without compromising performance. Versatile design options include collections of different woodgrain finishes, multi-width boards and tongue-and-groove profiles.

Durability is a cornerstone, evidenced by decades-long, warranted lifespans. TimberTech Advanced PVC Decking delivers better fire resistance than traditional wood and composite decking materials, and its weather resilience is suitable for climate-risk regions. Maintenance is minimal and a fraction of that required by wood.

Because TimberTech Composite is made from up to 85% recycled materials and TimberTech Advanced PVC is made from up to 60% recycled materials (and at end-of-life is itself recyclable), TimberTech Decking is a more sustainable option than wood. Its parent company, AZEK, is the largest vertically integrated PVC recycler in the U.S. Plus it outperforms traditional wood decking and even exotic hardwoods like ipe in environmental impact.

In conclusion, TimberTech signifies a decking paradigm shift, offering unmatched beauty, durability, and sustainability. Architects and designers specifying TimberTech empower homeowners to enjoy premier outdoor living spaces for decades, without compromising aesthetics or environmental responsibility.

To learn more visit **TimberTech.com** or call **1.877.275.2935.**

ORDER SAMPLES

To order samples, simply scan here.