Solid vs Engineered Wood Flooring

A practical comparison taking into consideration **cost**, **quality**, **performance**, and the **environment**.

Foreword

With sawdust in our veins, we come from the old school in which wood floors to us meant solid wood floors and engineered floors were just cheap substitutions for the real thing!

Today we still believe solid wood floors are best if:

1) installed on a wood subfloor already in place (to allow nail down)
2) being installed in an area without much relative humidity change from summer to winter (as solid wood shrinks/expands more than engineered and thus will show more cracks)
3) the solid wood is cheap and plentiful (as it really is a waste to use expensive and precious woods in a solid format when the wood at the tongue and levels below does not add to the life of the floor as you cannot sand below the tongue anyway)
4) one plans on leaving the floor in place and never changing it (otherwise, less expensive engineered floors should be used)

In most other situations, we now believe engineered wood flooring to be the better choice.

Myths & Reality

Myth: Solid wood floors are of higher quality.

Reality: Engineered flooring can have an equivalent or near-equivalent wear surface to solid flooring for subsequent re-sanding, as so-called 3/4" solid wood has only about 1/4" (6 mm) of wood above the tongue and groove. Because it is more stable and does not have to acclimate on the job-site prior to installation, the tongue-and-groove fit on engineered flooring can be milled so exactly that the product can be "floated," while solid flooring generally must be nailed down. Finally, engineered flooring can be cost-effectively made from veneer-quality wood, the highest quality wood available.

Myth: Solid wood floors cost less.

Reality: With less expensive species, solids are generally cheaper than engineered, while with more expensive species, solids become more expensive than engineered as they use more of the valuable hardwoods. What matters aren't upfront costs, but installed costs, and using prefinished engineered is nearly always more cost effective than using unfinished solid.

Myth: Solid wood floors will outlast engineered wood floors.

Reality: The better engineered products available today have thick, sawn wear layers that rival the 1/4" wear surface of solid wood flooring. The key point to remember is that you walk on the finish, not the wood; if a floor is properly maintained and recoated as needed, it will never need to be sanded and refinished and will last a lifetime. Also, new, environmentally-friendly adhesives used to glue up the layers that make up an engineered floor are guaranteed never to fail (we and other quality manufacturers offer a lifetime warranty on the construction of our engineered products).

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Overview

Both solid and engineered wood flooring have a place in the marketplace. Each has its appropriate application, depending on project conditions and customer priorities. We manufacture both formats, and recommend one or the other depending on the circumstances.

That being said, there are a number of persistent myths and misconceptions surrounding engineered wood flooring. The purpose of this piece is to dispel these myths and set the record straight on the benefits of engineered wood flooring, which are considerable.

Cost

The single greatest cost benefit of engineered wood flooring over solid lies in costs saved when installing over concrete.

Solid wood requires a plywood subfloor as it generally has to be nailed down. If the site has concrete sub-floors, then purchasing and installing plywood on top of the concrete in order to accept solid wood floors generally adds $2 to $2.65 per sq. ft.

Comparison of Cost Breakdown:
Solid vs. Engineered wood flooring

	Solid	Engineered
Flooring	$5.00	$6.00
Installation	$2.50	$2.50
Subfloor	$1.75 cdx	$0.70 glue
Felt paper	$0.05	$0.00
Sand & Finish	$3.00	$0.00
Total Cost	$10.55 / sqft	$8.50 / sqft

The cost to install a solid unfinished wood floor includes purchase and installation of a vapor barrier, subfloor materials (often plywood), felt paper, installation of the wood itself, and finally sanding and finishing (for unfinished, as opposed to pre-finished, solid flooring). On average all of this will add about $6.50 per sq. ft. above and beyond the cost of the wood flooring itself. For pre-finished solid, additional costs will still be about $3.50 per sq. ft. NOTE: this does not include any requirements for a sound barrier.

Typical installation of a prefinished engineered wood floor is about $2.50 per sq. ft. For glue-down installations, a good quality adhesive will add about $.70 per sq. ft. and floating installations will add much less. Engineered is easier, cleaner, and faster to install and transitions to other types of flooring are usually much easier to perform, because engineered wood flooring that is glued down or floated is closer to other types of flooring (carpet, ceramic, etc.) in thickness.

The purchase price of engineered wood flooring (in formats WITH A SAWN 2.5MM + WEAR LAYER which, like solid wood, allow for subsequent sanding/refinishing) vs. solid unfinished wood flooring is generally

pretty similar. With less expensive species, solids are generally cheaper than engineered, while with more expensive species, solids become more expensive than engineered as they use more of the valuable hardwoods.

Thinner engineered products with veneer faces, as opposed to thicker, sawn-wood wear layers, are typically much less expensive than solid wood floors and are generally not re-sandable.

Quality & Performance

Most people outside of the wood flooring industry perceive solid wood flooring to be of higher quality than engineered wood flooring. In no small part, this is because people have not been educated as to relatively recent advances in the industry, particularly in the production processes of high-tech computerized mills.

People generally assume that solid 3/4" wood flooring is better quality because it is thicker than engineered flooring. But consider these facts:

- Because it is more stable and does not have to acclimate on the job-site prior to installation, the tongue-and-groove fit on engineered flooring can be milled so exactly that the product can be "floated." Because they move more in service, the tongue-and-groove fit of solid wood floors is looser and the floors are sanded in place to get them flat, gaps and flaws are filled, and then the floor is finished. High-quality engineered wood floors are flat, well fitted, and finished out of the box!
- A major determinant of quality in wood is the aesthetic appearance of the product, which in turn is determined by its grade (high grade is free of knots, sapwood, and natural defects), graining (straight grain is often considered superior to mixed grain), and dimensions (long and wide usually trumps narrow and short).
  - The highest quality wood from this standpoint is wood that comes from logs that are used to produce architectural veneers. The cost of finding this grade of wood in solid flooring is very high. We use veneer-quality wood for the wear layers of some of our engineered products, and the price is reasonable because the wood is a by-product of veneer production.
- Solid flooring is not 3/4" of useable material—it typically has only about 1/4" (6 mm) of wear surface above the T&G. From the T&G down you are basically misusing a valuable and finite resource (high-quality wood) as a platform to support the part that matters—the part above the tongue.

Wasted Material Comparison

In solid flooring, all material below the T&G (dashed line) is not actually usable material.

In engineered flooring, this valuable high quality wood is not wasted below the T&G.

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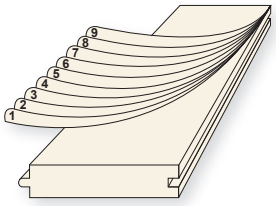
Quality & Performance *(continued)*

- The better engineered products have thick sawn wear layers (2.5 mm and thicker). The most expensive match the thickness of the available wear surface in solid flooring. In terms of how many times you can sand and refinish these two products, they are equal. This begs the question: how thick a wear surface do you really need in order to consider a wood flooring product "high quality"? You want enough so that the product will last decades or even lifetimes. How much is enough? After all, if thicker is better, why not use wood flooring that is 2" or even 3" thick? Answer: because it is wasteful and unnecessary for 99.99% of the applications out there. Once again, you walk on the finish, not the wood.
- Longevity is the key to quality and, outside of extraordinary circumstances, the life of a wood floor is determined by a) its ability to withstand wear and b) how many times you can sand and refinish it. Most people only think of the latter and, until five or ten years ago, there was good reason for this: finishes then were softer and prone to scratching and wearing through after heavy or prolonged use, therefore requiring periodic sanding and refinishing. However, advances in finish technology have been dramatic. With today's factory finishes, full sanding and refinishing will be rarer, and thankfully so given the expense and inconvenience they entail.

Factory Finish Example



1: Primer Coat
2,3: Fill Coats with aluminum oxide
4,5,6: Sealer Coats
7,8,9: High Wear Top Coats

- Today, the ability of wood flooring to withstand wear is a function of two main factors:
  - **Hardness of the species.** Solid and engineered wood flooring, provided the wear layer is 1.5mm or thicker, are on equal footing here as long as you are comparing apples to apples in terms of species selection.
  - **Quality of the finish that is on top of the wood.** Here, engineered flooring is the clear winner over unfinished solid wood simply because the finish is applied at a modern factory, not done on-site with all of its inherent dust, fumes, and several days of drying time. The controlled factory environment means a smooth, even finish free of the debris found in site-finished floors.
- Total re-sanding is typically only done once every ten years or more--and if a wood floor is maintained properly and then re-coated every four or five years, it will never have to be sanded and refinished.
- Two final and crucial measures of product quality are ease of installation and stability in service. Here, engineered flooring is a clear winner. Ease of installation is covered below. When it comes to stability, most engineered flooring is about 5 times as stable as solid wood. This is because engineered flooring is constructed like plywood—multiple layers are glued up and engineered to balance the natural process of expansion and contraction that all wood products undergo. Most failures of wood flooring installations are due to wood expansion in reaction to high moisture conditions, or shrinkage when ambient moisture drops. Engineered wood moves less and hence is much less prone to failure due to moisture.

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Environmental Issues

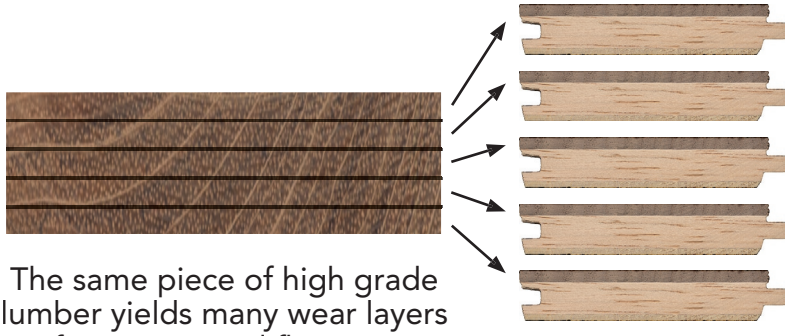
Most peoples concerns about the *sourcing* of wood products can be satisfied by using products that are either certified sustainably-harvested (FSC), recycled/reclaimed/ salvage, or a combination of the two.

Beyond responsible sourcing, there are several factors that make engineered flooring superior from a resource efficiency and utilization perspective, and this is an important and sometimes overlooked aspect of sustainability:

- As noted elsewhere, solid flooring is not 3/4" of useable material—it is 1/4" of wear surface above the T&G. From the T&G down, you are basically using a valuable resource as a platform to support the part that matters. Engineered flooring generally uses lower grades of the most abundant species in the platform, saving the high grade material for the part that counts: the wear layer.
- The yield of engineered wear layers in manufacturing is much more efficient than that of solid flooring. The latter is generally milled from 1" thick lumber. From that same piece of lumber, a modern engineered flooring mill can derive 5 or even 6 three mm (1/8") wear layers. This means that from the same amount of raw material, we can cover roughly 5 times as much area if we use the high grade lumber to make engineered rather than solid flooring.

Lumber Yield Comparison:
Solid vs. Engineered wood flooring

One piece of high grade lumber yields only one plank of solid flooring.



The same piece of high grade lumber yields many wear layers for engineered flooring.

Environmental Issues *(continued)*

- Solid flooring must be nailed down, usually to plywood. All that subfloor material uses more wood with all associated upstream impacts. Engineered flooring can be installed by gluing directly to or floating over concrete and other subfloor surfaces. Eliminate all plywood sub-floors, and you save a lot of trees, eliminate energy used and pollution produced in manufacturing and transportation, etc.
- Depending on distances from forest to mill and from mill to jobsite, the embodied energy of any given wood product will vary. There is no question that a solid wood product that is harvested and manufactured within 500 miles or less of a jobsite will have significantly less embodied energy than an engineered wood product that is manufactured overseas using global sourcing. But is it enough to offset the embodied energy in the plywood mentioned above, much less outweighing all of the other environmental advantages of using engineered?
- Further, the actual embodied energy in a wood flooring product will depend in good part on the means of transportation used to ship the product from the mill to the jobsite. Consider that it requires far less fossil fuel to ship products by sea than it does to ship products by truck. Therefore, it is entirely possible and even likely that a product that is manufactured in China and delivered by container ship and local trucking to a jobsite in, say, San Francisco has lower embodied energy than a product that is manufactured in Maine and shipped 500 miles by truck to a jobsite in the Midwest.

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