

Saving Face

This exclusive perspective on wood finishing is contributed by **Luke Hughes**, one of Britain's leading furniture designer-makers for corporate and public buildings.

The window frames for Salisbury Cathedral in the UK were made in English oak c1250. And there is a door in Westminster Abbey made in 1046, still hanging on its hinges. In both cases the timbers are not 'finished', yet have become so hard that high-speed drill bits barely make an impact.

Oak is not indestructible, being prone to death-watch beetle and rot, but if the boards are carefully selected and the weathering details well thought out, there is no reason why it should not last for centuries.

The lesson is, get the materials and the weathering details right, and finishing should not be needed. But the combination of wind, rain, sun or beetle will soon find you out if you get it wrong. No amount of fancy chemical applications will stop them.

So when it comes to outdoor wood performance in particular, it is up to the designers. Unfortunately, they tend not to understand enough about material selection or design detailing. A concerted timber detailing training programme is long overdue. Designers must take into account what nature does naturally.

Types of finish

There are basically three types of finish: evaporative, reactive and coalescing. Wax is an evaporative finish because it is dissolved in turpentine or thinners to make a paste – once the thinners evaporate, all that's left is the

wax. Reactive finishes use solvents such as white spirits and naphtha. Oil varnishes and linseed oil are reactive finishes which change chemically when they cure, unlike evaporative finishes. At cure, the solvent/thinner evaporates and the resins cluster together. A chemical reaction then occurs, causing the resins to cross-link in a different chemical format.

Most modern furniture is finished with nitro-cellulose lacquers (or their waterborne equivalents). Other finishes include French polish, oil (Danish, teak or linseed), varnish, polyurethane lacquer, shellac, beeswax or even vaseline; they all have their uses but are less adaptable to commercial applications. Nonetheless, an oil finish may suit some kinds of institutional furniture (e.g. refectory tables for a school or college) while a beeswax finish is still sometimes specified for church work.

It is worth remembering that all finishes have pros and cons, e.g.:

- gloss can be harder wearing than matt but is inclined to look 'treacly'
- wax finishes are easy to service but are inclined to show every finger mark

- acid-catalysed lacquer is tough but difficult to apply and, later, to repair without stripping the whole surface.

The accompanying table over page shows a series of finishing characteristics, based on my 30 years' experience and gives a scale of 1-5 for each characteristic. It quickly becomes obvious that even old-fashioned finishes still have considerable advantages, especially when considering the ease of long-term maintenance.

The two principal furniture grades of nitro-cellulose lacquer are pre-catalysed lacquer (single-pack, spray or brush-applied lacquer) and acid-catalysed lacquer (a two-part compound applied by spray, of which the second part is a catalytic hardener); it is usual to use one sealing coat and two topcoats with no more than two hours between coats.

Pre-catalysed and post-catalysed 'lacquers' are reactive finishes. While oil-based varnishes dry from the top down by reacting with oxygen, catalysed lacquers dry from the bottom up – the solvents migrate to the surface, leaving behind molecules which then cross-link.

Denibbing or light sanding is advisable ▶

Dining Hall, Corpus Christi College, Cambridge. The ravages of alcohol and hot soapy water (twice a day) take a toll on tables. That's where penetrating oils come into their own



ABOVE: Large, flat surfaces like this board table at the HSBC headquarters in London required repeated spray-finishes and denibbing to combat blemishes.
ABOVE CENTRE: Many of the oak frames in Salisbury Cathedral's myriad windows are rock-hard from weathering after 700 years.



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	General Durability															Typical uses	
	1	3	1	1	2	1	5	5	5	5	5	5	5	5	5	34	Joinery in high quality/ 'heritage' buildings, churches etc
	1	1	1	1	1	1	4	5	5	3	4	27	Joinery in high quality/ 'heritage' buildings, churches etc				
	1	3	1	1	1	1	4	5	5	4	3	29	Joinery in high quality/ 'heritage' buildings, churches etc				
	3	1	4	2	3	3	4	4	4	4	4	36	Garden benches, exterior joinery, cottage style furniture				
	3	1	4	2	3	3	4	4	4	4	4	36	Garden benches, exterior joinery, cottage style furniture				
	1	5	1	1	1	1	3	4	3	4	5	29	Toys, sealing coat on occasional items, antiques				
	1	3	2	1	1	1	4	1	1	2	18	Antiques, especially with close grain like mahogany					
	2	4	2	1	2	1	3	3	2	3	3	26	Internal joinery sealing coat				
	3	4	3	3	3	3	4	4	4	2	2	35	Modern domestic furniture with medium wear, chairs				
	5	4	4	3	4	4	1	3	4	2	2	36	Heavy traffic table tops, work surfaces, office furniture etc.				
	5	4	4	3	4	4	1	3	4	2	2	36	Spray application for furniture and joinery				
	4	4	4	3	4	3	1	3	4	2	2	34	Spray application for furniture and joinery				
	3	1	2	2	2	2	4	4	5	4	4	33	As for Danish and Teak oil etc.				
	5	4	5	4	4	5	1	1	5	1	1	36	Bartops with heavy lacquer 'feel'				

Notes

Gratings are 1-5 (-ve/+ve)

These are a purely subjective view; much depends on brand type, number of coats, the atmospheric conditions prevailing when the application is made but above all in the skill employed by the finisher

between coats, to flatten imperfections and provide a key between the non-reactive surfaces.

Acid-catalysed finishes are among the toughest – but although resistant to heat and alcohol, prolonged contact will still damage the surface; alcohol is, after all, a chemical solvent.

Wood stains

All timbers (solid and veneer) are capable of being stained, but some (such as American red oak, beech or mahogany) take stain better than others. Some woods (e.g. pine or cherry) take stain unevenly, resulting in ‘blotching’ – best avoided by using a barrier coat before staining.

Stains can be capricious in their effects: they can take to veneers more easily than to solids; and can be absorbed at different rates depending on whether they are applied to end grain or cross grain.

If furniture must be stained, it is infinitely preferable to apply the same stain at the same

time; otherwise precise matching is rarely possible.

It is worth noting that stains are affected by exposure to ultra-violet light – the sun is an effective bleacher.

Application

The process starts with surface preparation, either sanding by hand (typically using a sanding block or power sander), scraping or planing.

Once prepared and stained, a number of coats are applied, often sanding between coats to fill the grain and flatten out imperfections. Commonly used wood finishes include wax, shellac, drying oils (such as linseed oil or tung oil), lacquer, varnish or paint.

Surfaces may be buffed using steel wool, abrasive papers or rubbing compounds, depending on the shine desired (measured according to ‘grit’ per sq cm, ‘80’ being coarse, ‘320’ being extra-fine). Often, a final coat of wax



The 600-year-old door at Amesbury Abbey – one of thousands of medieval doors that exist in UK churches, cathedrals and castles



Luke Hughes clergy seats, Westminster Abbey – American black walnut with Danish oil and beeswax finish.

can be applied over the finish (although it can react adversely with the base coats).

Special tools used to apply wood finishes include rags, rubbing pads, brushes and spray guns. The processes involved and the materials terminology used differ around the world. For instance, the process of replicating the look and feel of traditional ‘French’ polished wood is more commonly achieved in the UK by ‘pulling over’ pre-catalysed lacquer (within 24 hours of spraying).



Nitro-cellulose laquer tends to be used for domestic furniture. The trick is in avoiding a ‘treacly’ gloss. Dining chair in American cherry (Luke Hughes)

Manufacturers who mass-produce products have automated flat-line finish systems with processing stations that may include sanding, dust removal, staining, sealer and topcoat applications. As the name suggests, the primary part shapes are flat. Liquid wood finishes are applied via automated spray guns in an enclosed environment or spray cabin. The material can then enter an oven or be sanded again depending on the manufacturer’s set-up. It can also be re-entered into the assembly line

to apply another coat of finish or continue in a system that adds successive coats.

Two common methods of automating the wood finishing process are the hang-line and tow-line.

In the hang-line, items are hung by carriers or hangers attached to a conveyor system that moves them overhead or above the floor space. Items can also be moved up to warmer air at ceiling level to speed up the drying process.

Tow-line finishing uses mobile carts propelled by conveyors mounted in or on the floor. This approach is useful for moving large, awkwardly shaped products such as four-legged wood furniture. The mobile carts used in the tow-line approach can be designed with top platens that rotate manually or automatically.

Floor protection

The biggest challenge to keeping timber flooring looking good is abrasion, and with it those unsightly patches in highest-traffic areas. Inevitably, finishes that sit on the top of the timber will eventually wear through and look scruffy.

There are a number of professional brands that provide perfectly serviceable finishes. And I have encountered one that acts like a deep-penetrating oil which then oxidises.

It leaves a highly resistant, easy-to-maintain finish, allows the natural colours of the timber to come through, comes in low-gloss level, architect-friendly matt finishes and works brilliantly on any type of wood.



(THE AUTHOR: Luke Hughes has operated his design practice in London's Covent Garden for more than 30 years. He has designed and made furniture for major public buildings, including the UK

Supreme Court, the Houses of Parliament, more than 50 Oxford and Cambridge colleges, 25 significant public libraries, five royal palaces and over 1000 boardrooms for major multinational businesses. Hughes designed the furniture in Westminster Abbey used for the royal wedding in April 2011. In 2010, he was shortlisted for the Walpole Award for British Luxury Design Talent. Email: l.hughes@lukehughes.co.uk ■

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