ATFA ONLINE WORKSHOP

KEY PROPERTIES OF COATINGS

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atfa

Australasian
Timber Flooring
Association

Local professionals,
world-class standards.

AUSWOOD

PREMIUM FLOORING SOLUTIONS

Brumby Range 5G

Brumby Range LUX

enviroFLOOR Premium

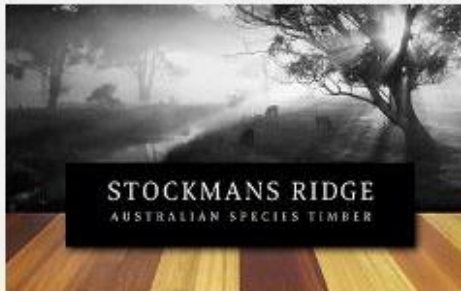
enviroFLOOR premium

enviroLUX

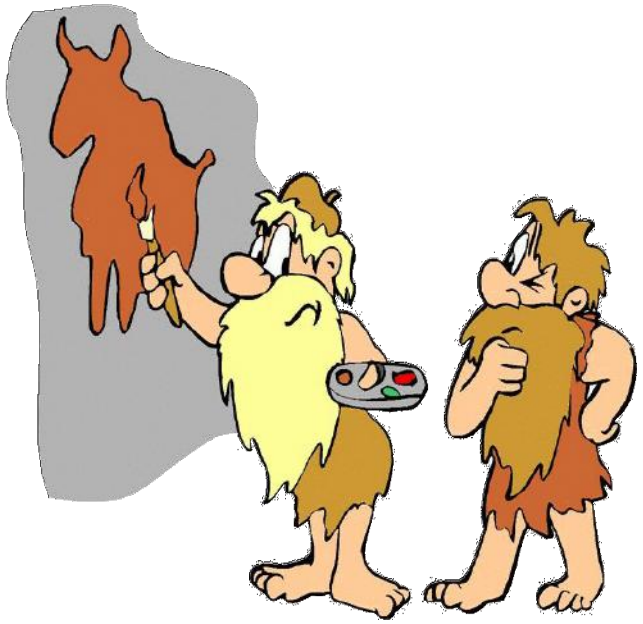
enviroLUX

STOCKMANS RIDGE PREMIUM

STOCKMANS RIDGE



ORIGIN OF TIMBER COATINGS



EVOLUTION OF TIMBER FLOOR COATINGS - OILS

- Penetrating drying oils – from 3,000 BC – Tung, linseed, safflower, poppy
- Boiled oils
- Chemical ‘driers’ / crosslinkers – cobalt, lead, zinc, calcium
- Blending to make enamels– nitrocellulose – first modern paint of the 20th Century
- Blended with alkyd resins – lacquers
- Blending with hard waxes
- Blending with urethanes – OMUs
- Blending with hard waxes with isocyanate cross linkers (2 pack coatings)

EVOLUTION OF TIMBER FLOOR COATINGS – SINCE 1950'S

- 1940's vinyl/linoleum gave way to carpet and solid timber feature flooring floorsanding machines in the 1920's drove timber flooring as an option
- Polyurethane in the 1950's blended with oils and alkyds improved wear resistance
- Urethane modified oils (UMO and OMU) increased popularity from the 1950's
- Moisture cure and two pack solvent borne polyurethanes emerge in the 1970's
- Waterborne polyurethanes emerge in the 1970's
- Two pack waterborne polyurethanes emerge in the 1980's
- U.V. curing of pre-finished emerges in the 1980's
- Isocyanate crosslinked oils and hard wax oils emerges in the 1990's
- Waterborne polycarbonates appear in the 2010's
- Prefinished Engineered flooring with LED cured Hard Wax Oils
- 2020's and beyond will see zero VOCs and SVOCs driven by global warming

WHY DO TIMBER FLOORS REQUIRE A COATING?

To enhance aesthetics (appearance)	Functional performance (protection of the asset)
• Sheen (gloss level) – high gloss to natural • Colour impact of timber it is applied to (bleaching through to wood warming)	• Wear resistance (floor longevity) • Maintenance requirements – High, medium or low • 'Recoatability' • Resistance to scratching, scuffing and marring • Chemical resistance • U.V yellowing resistance

WHAT IS IT THE CUSTOMER WANTS ?

The customer may ask for …	For consideration by the contractor
Certain timber species or colour	• Show samples including prefinished • Show examples of how coatings can impact finished floor appearance re colour
Low or high maintenance	• Explain exactly what these terms mean and their on-going maintenance commitment (refer next slide)
Health factors	• Outgassing can impact health of respiratory sensitive (asthma, MCS, emphysema etc) and pregnancy (Teratogens). Outgassing can last for months! • Understand VOC and SVOC • One and two pack solvent borne polyurethanes can contain TDI (Toluene Diisocyanate) a class 2 carcinogen • Most 2 pack hardeners are isocyanates including polyurethanes and hard wax oils • What is the advice as to when it is safe to reoccupy the premises after coatings application? How does one define safe? (refer to a later slide)
A durable coating as they have active children	• Parents may also be time-poor so low maintenance to be considered • Scuff and chemical resistance may be considerations
Surface to accommodate pet dogs	• Scratch resistance required
Will not discolour/yellow	• Aliphatic UV resistant coatings required
A long life till refurbishment	• Low maintenance and long life – Taber abrasion data is a good indicator

CLIENT MAINTENANCE COMMITMENT!

A key consideration that is sometimes misrepresented in a sales pitch!

Low maintenance coatings

- Typically weekly maintenance with simple dust sweep or soft head vacuum and damp mop with mild detergent

Medium maintenance (often commercial premises)

- As above plus damp mop apply coat of a metalised polish (refer Timber Floors Magazine Issue 42) as required

High maintenance

- Oils have a very high maintenance requirement. Rejuvenating finish needed and polishing sometimes advised
- Hardwax Oils have less maintenance requirement than Penetrating Oils.

TECHNICAL PROPERTIES

Technology and Property	Penetrating Oil	Hard wax oil 1 and 2 K	Oil Alkyd	Oil modified Urethane	Acid catalysed
Durability	Low – med	Med	Low	Med	Med – high
Taber Abrader CS17, 1,000 cycles, 1 kg load	n/a (no surface film)	150+ (If surface film)	130+	85+	85+
Typical expected years to requiring a refurbishment coat	1 – 2	1 – 6	3	4	4 – 5
Maintenance requirement – Care daily, monthly	Low – high	Low – high	Med	Med	Low
Repairability of localised damage	Good	Good	Difficult	Difficult	Difficult
Earliest 'with care' use @ 25^{0}C	5 days	2 days	3 days	3 days	3 days
Earliest re-occupancy time @ 25^{0}C	7 days	7 days	5 days	5 days	5 days
Ability to cure in cold and dry weather (no burnish)	Low	Low	Low	Low-medium	Low – medium
Rejection resistance (from surface tension)	Good	Good	V. good	Good	V. good
Edge bonding resistance	V. good	V. good	V. good	V. good	Good
Timber colour impact	Darkens	Yellow / honey	Darkens	Darkens	Darkens
Tram lining	Nil	Nil	Nil	Low	Nil
Application marks resistance	High	Medium	High	Medium	High
UV yellowing resistance	Poor	Fair	Poor	Poor	Poor
Exterior use	No	No	No	No	No
Surface scuff resistance	Poor	Poor - Good	Poor	Poor	Good
Dust pimples from electrostatic attraction of dust	Low	Low	Low	Low	Low
Quilting resistance	V. good	V. good	V. good	V. good	V. good
Grain raise effect	Low	Low	Low	Low	Low

TECHNICAL PROPERTIES (CONTINUED)

Technology and Property	Solventborne MC 1 pack Polyurethane	Solventborne 2 pack Polyurethane	Waterborne 1 pack 'Polyurethane'	Waterborne 2 pack Polyurethane	Waterborne 1 pack Polycarbonate	Waterborne 2 pack Polycarbonate
Durability	High	High	Med	High	High	High
Taber Abrader CS17, 1,000 cycles, 1 kg load	18+	25+	25+	18+	7+	3+
Typical expected years to requiring a refurbishment coat	6	6	4 – 6	5 – 6	5 – 6	7 - 8
Maintenance requirement – Care daily, monthly	Low	Low	Low – med	Low	Low	Low
Repairability of localised damage	Very difficult	Very difficult	Difficult	Difficult	Difficult	Difficult
Earliest 'with care' use @ 25^{0}C	2 days	1 day	2 days	1 day	1 day	1 day
Earliest re-occupancy time @ 25^{0}C	3 days	2 days	3 days	4 days	2 days	2 days
Ability to cure in cold and dry weather (no burnish)	Medium	Good	Low	Medium	Medium	Good
Rejection resistance (from surface tension)	Fair	Fair	Poor	V. good	V. good	V. good
Edge bonding resistance	Poor	Poor	V. good	Good	V. good	V. good
Timber colour impact	Yellow/honey	Yellow/honey	Natural/pale honey	Natural/pale honey	Darker honey	Darker honey
Tram lining	Low	Low	High	Medium	Low	Low
Application marks resistance	High	High	Poor – medium	Medium	Medium	Medium
UV yellowing resistance	Poor	Poor	Fair – good	Good	V. good	V. good
Exterior use	No	No	No	No	Yes	Yes
Surface scuff resistance	V. good	V. Good	Poor - good	Good – V. good	V. good	V. good
Dust pimples from electrostatic attraction of dust	Medium	High	Low	Low	Low	Low
Quilting resistance	Poor	Medium	V. good	V. good	V. good	V. good
Grain raise effect	Low	Low	Medium	Medium	Medium	Medium

CHEMICAL RESISTANCE

Chemical resistance depends on: Chemical type, concentration, temperature, degree of exposure, duration of exposure

Exposure	Penetrating Oil	Hard wax oil 1 and 2 pack	Alkyd Oil	Oil modified Urethane	Acid catalysed	Solventborne MC 1 pack Polyurethane	Solventborne 2 pack Polyurethane	Waterborne 1 pack Polyurethane	Waterborne 2 pack Polyurethane	Waterborne 1 pack Poly Carbonate	Waterborne 2 pack Poly Carbonate
Exterior	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Good	V. good
Coffee	Poor	Fair	Good	Good	Good	V. Good	V. Good	Poor	Good	Good	V. good
Texta	Poor	Poor	Poor	Fair	Fair	Good	V. Good	Poor	Poor	Fair	Fair
Ethanol	Poor	Poor	Poor	Poor	Good	Good	V. Good	Fair	Good	Fair	Fair
Turps	Poor	Poor	Poor	Fair	Good	V. Good	V. Good	Fair	Good	Good	Good
Neat detergent	Poor	Fair	Good	Good	Good	V. Good	V. Good	Good	Good	Good	Good

For example, chemical resistance is important where children are active (e.g. paints and felt tip pens) or where animal urine may be a factor (urine penetration and staining of coating and timber is generally less for more chemical resistant coatings).

SAFETY, HEALTH AND WELFARE FOR THE PREMISES OWNER AND THE CONTRACTOR – ADVICE CAN VARY BETWEEN MANUFACTURERS

S. H & W Issue	Penetrating Oil	Hard wax oil 1 & 2 pack	Alkyd Oil	Oil modified Urethane	Acid catalysed	Solventborne MC 1 pack Polyurethane	Solventborne 2 pack Polyurethane	Waterborne 1 pack 'Polyurethane'	Waterborne 2 pack Polyurethane	Waterborne 1 pack Polycarbonate	Waterborne 2 pack Polycarbonate
Odour – short term	Noticeable	Low	Medium	Medium	V. high	V. high	V. high	Low	Low – Medium	Low	Low
Breathing equipment needed in use per MSDS	Yes	Yes	Yes	Yes	Yes – daily change of cartridge	Yes – daily change of cartridge	Yes – daily change of cartridge	No	Yes	No	No
Contains Isocyanate	No	Yes if hardener used in 2 pack	No	No	No	Yes	Yes	No	Yes In hardener	No	No Isocyanate free
Contains listed carcinogen	No	Yes If white Spirits used	Yes If white Spirits used	Yes If white Spirits used	Yes class 2 Ethanol	Yes Class 2 TDI Isocyanate	Yes Class 2 TDI Isocyanate	No	Yes if part B is class 2 Polyazeridine	No	No
Specific asthma & respiratory warning to clients	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
Flammability	Low – high	Low – high	Low	Low	V. high	High	V. high	No	No	No	No

Refer the 2008 report conducted jointly by the ATFA and the Qld Occupational Hygiene and Chemicals Management Unit:

'Evaluation of exposure to selected hazards within the floor finishing industry including isocyanates, organic solvents, noise, wood dust and vibration'

SAFETY, HEALTH AND WELFARE – FLOOR COATING INDUSTRY

Floor sander with Isocyanate splash in eyes

Contact Dermatitis

Solvent inhalation cause child harm in both pregnant and breastfeeding mothers

Solvents and isocyanates are major asthma triggers

WHEN SHOULD CONTRACTORS WEAR RESPIRATORS AND EYE PROTECTION?

What do the coating manufacturers state via their MSDS/SDS ?

- **Hard Wax Oils – High Naptha Content. Waterborne Coatings – Glycol Ethers**

  "Wear a suitable respirator if the ventilation is not sufficient to keep the solvent vapor concentration below the occupational limit values"!

  BUT - How does a contractor, or the party selling the product to the contractor, determine this? – Most manufacturers cannot answer this!!

- **Solventborne Polyurethane, Acid Cure and OMU**

  Respirators mandatory – note the useful life of cartridges !!

  Some types offer no effective protection

OUT-GASSING

Outgassing is the escape of volatile chemicals from the applied coating, including those on the surface and also those absorbed into the timber flooring, over time. If one can still smell solvents or a 'paint' odour, then the floor is still outgassing and will continue to do so after the solvent smell has subsided.

Example of consequences are on the following slide.

- **VOC – Volatile Organic Content – Boiling point under 250 deg C**

  Mainly solvents of various types that escape within the first few weeks. Isocyanates will neutralise within days from reaction with atmospheric moisture..

- **SVOC – Semi Volatile Organic Content – Boiling point over 250 deg**

  Becoming more of an issue in Europe as these slowly evaporate over months or even longer and lead to low level inhalation by premises occupants over an extended period. Considered a cause of "Sick Building Syndrome"

ACTUAL CASE STUDIES OF NOT UNDERSTANDING BY NOT ENQUIRING OF A CUSTOMER'S NEEDS – WH&S

Case	Unidentified customer need	What the contractor coated the floor with	The problem that occurred	The fix
1	MCS - multiple chemical sensitivity sufferer	Coated floor with a MC polyurethane	Could not reoccupy premises for 3 months. A 2 pack waterborne PU was applied and still could not reoccupy the premises.	Install tiled floor over the timber floor
2	Early stages of pregnancy not considered	Softwood floor coated with Fast Dry Sealer and two coats of MCPU – all applied in the one day.	Reoccupied premises after 5 days – severe nausea for 2 months upon any re-entering of premises	Resanded and 1 pack waterborne PU applied
3	Regular visitor is asthmatic	Two pack waterborne Polyurethane – hardener was a solvent carrier isocyanate	Mother-in-law (MIL) could not visit family for up to 1 month without asthma from initial sensitisation	Upset customer and no MIL visits for 2 months

WORK HEALTH AND SAFETY - MYTHS AND FACTS

The myth	The facts
Respirator use. You can wear one until you can smell the solvent vapours coming through	The TLV (Threshold Limit Value) danger level can be well below the odour threshold. Solvents can impact internal organs and reproductive issues. Cartridge life may be as little as 8 hours*, especially Fast Dry Sealers. If one can smell the solvents when wearing a respirator, it is long overdue for a cartridge change
Waterbornes and Hardwax Oils do not contain solvents	Both classes may contain solvents although at low levels and of lesser toxicity – One brand out of many checked was actually solvent free.
VOC (Volatile Organic Content) is the key health indicator of a coating. What about SVOC?	The jury is still out. VOC is the release of faster evaporating solvents and carriers. SVOC (Slow Volatile Organic Content) – slower evaporating solvents and carriers that continue to emit over longer periods of time are an increasing concern.
Outgassing will be complete in a few days so OK to reoccupy premises	If one can smell solvent odours, then the floor is still outgassing - applies to all coating types as they all contain solvents (SVOC or VOC) albeit some are more potent than others. It will continue to outgas for some time after solvent smells are not detectable. So, when is it safe to reoccupy? The legal guideline is below the STL (Short Term Limit value) of solvents in the air. This is generally achieved within a few days or less if a premises is ventilated. **However, discuss with the customer as if respiratory issues are present in family or visitors, the typical time for a few days may extend to some much longer time. Your Duty of Care!!**

ACCESSING THE SDS / MSDS

Refer ATFA Info Sheet #28 on interpreting the SDS

1. Refer ATFA Info Sheet #17 from 2012, targeted for update in 2021

3. GBCA (Green Building Council of Australia) Green Star Compliance – VOCs

4. GECA (Good Environmental Choice Australia), Environmental Performance Standard - Paints and Coatings
   - Much tighter VOC compliance levels than GBCA

INTERMISSION

1. When should one wear a respirator?
2. When should you change the cartridge?
3. Should you carry a copy of the SDS in your work vehicle?
4. How can you determine if out-gassing has ceased?
5. What are some of the essential questions to ask of the premises owner in order to recommend a coating system?
6. Is there such a thing as a non-toxic coating system?

AUSWOOD

PREMIUM FLOORING SOLUTIONS

See you in 5....

Brumby Range 5G

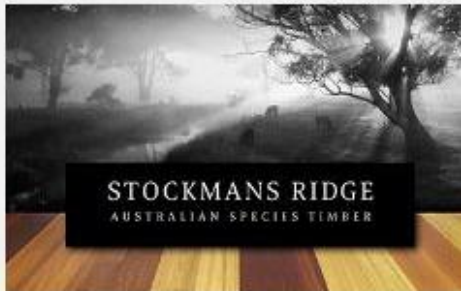
Brumby Range LUX

enviroFLOOR Premium

enviroLUX

STOCKMANS RIDGE PREMIUM

STOCKMANS RIDGE



CONSIDER THE ADVANTAGES AND LIMITATIONS OF COATING CATEGORIES

PENETRATING OILS

Strengths

- Mild gloss
- 'Warm' enhanced timber colour
- Penetrate wood pores to bring out gain patterns
- Easy to work apply and refurbish
- Have been around for over 3,000 years

Limitations

- Poor wearing
- Need regular time consuming maintenance
- Water spotting and low liquid resistance
- Very high VOC, some products over 50% hydrocarbons
- Longer term outgassing
- Very flammable

HARD WAX OILS

Strengths

- New generation of vegetable oil polyol based polyurethanes have high durability with minimum maintenance
- Penetrate the timber surface and bind surface layer fibres. Non-film forming.
- 2 packs utilize an isocyanate hardener for significant increase in durability
- Timber colour enhancement
- Zero VOC for some brands
- Low sheen
- Early use of floor after coating
- Microporous for floor breathability

Limitations

- Oxygen curing process can be very slow below 18°C
- Yellow or darken over time
- 1 pack has low durability
- High on-going maintenance
- Scuff and scratch easily but readily buffed away or hide under another coat of wax
- Some brands are actually VOC free, others can contain significant hydrocarbon solvent

ALKYD FLOOR COATINGS

Strengths

- Low cost
- Good ‘wood warming’ or colour enhancement
- Good film flexibility for low edge bonding
- Modest wear resistance
- Prior to MC Polyurethane and OMU Alkyd was the most popular timber floor coating
- Easy to spot repair
- Quilting tolerant

Limitations

- High VOC
- Flammable
- Very slow curing in cold weather
- Poorer wear resistance than OMU, solventborne PU and 2 pack WB PU or Polycarbonate
- Darken with time
- May require sacrificial coating in high wear areas

URETHANE MODIFIED OIL (UMO)

Strengths

- Low cost
- Good ‘wood warming’ or colour enhancement
- Good film flexibility for low edge bonding
- Intermediate wear resistance
- Prior to MC Polyurethane OMU was the most popular timber floor coating
- Easy to spot repair
- Quilting and rejection tolerant

Limitations

- High VOC
- Flammable
- Oxygen curing so slow curing in cold weather
- Poorer wear resistance than solventborne PU’s and 2 pack WB PU or Polycarbonate
- Darken with time
- May require maintenance with a Metalised Polish in high wear areas

ACID CATALYSED

Strengths

- Low cost
- Good wood colour enhancement
- Fast cure – coating completed in one day
- Easy to apply
- No separate sealer required
- 2 pack enhances durability

Limitations

- High VOC
- Flammable
- Very strong odour

MOISTURE CURE (SINGLE PACK) POLYURETHANE

Strengths

- Excellent wear resistance
- Good timber colour enhancement
- Easy to apply
- Fast dry sealers were developed to increase coats per day
- Range of sheen levels. Gloss is very high gloss (wet look)
- Range of solids contents, 40% to 70%
- Same day two coat system with high film build for 70% solids MCPU with fast dry sealer (longer outgassing if using this option)
- Low cost than waterbornes

Limitations

- High VOC
- Flammable
- Susceptible to Edge Bonding
- Strong odour
- High Toxicity. Respirator use essential in application. Contains TDI isocyanate and very high solvent content
- Slower cure in low humidity as rely on moisture in the air to enable curing
- High solids prone to quilting

TWO PACK SOLVENTBORNE POLYURETHANE

Strengths

- Excellent wear resistance. *Arguably, the most durable of all coating options.
- Good timber colour enhancement
- Easy to apply
- Fast dry sealers were developed in the early 90's to increase coats per day
- Range of sheen levels. Gloss is the highest of all coatings wet look
- Hi solids content – typically 50%. Gives a desirable high build 'wet look' for some customers
- Best chemical resistance of all timber floor coatings
- Quilting resistance from low viscosity and low surface tension

Limitations

- High VOC
- Most flammable of all timber coatings
- Most toxic of all coating types during application (can contain ketones and high TDI isocyanate)
- Most susceptible to Edge Bonding of all coating options
- Strong odour
- Respirator use essential in application. Contains high level TDI isocyanate in part B and also very high solvent content
- High dust acceptance increases risk of 'pimples' in cured coat
- Increased wastage from left over mixed product

ONE PACK WATERBORNE POLYURETHANE (1K WBPU)

Strengths

- Low toxicity, GBCA compliant low VOC
- Non-yellowing
- No edge bonding
- Moderate wear resistance (if an acrylic content present, the higher this is, the lower the wearing resistance)
- Quilting resistance
- Rejection resistance
- Lower cost than 2 pack WB
- Breathable
- Mild odour

Limitations

- Limited durability/wear resistance
- Tramlining
- Paler timber colours
- More expensive than solventborne coatings
- High water vapour transmission rate – not suitable for intermittent wet area e.g. kitchens

TWO PACK WATERBORNE POLYURETHANE (2K WBPU)

Strengths

- Low toxicity, low VOC
- Non-yellowing
- Edge bonding resistant
- Good to very good wear resistance
- Quilting resistance
- Improved rejection resistance
- Breathable
- Mild odour (some hardeners can add to odour due to solvent carrier)
- Gloss / sheen level from gloss to natural

Limitations

- Paler timber colours although new technology sealers improve this
- More expensive than solventborne coatings
- Hardeners are typically isocyanates – inferred toxicity but essentially non-toxic unless consumed
- Sheen level varies with brand

ONE PACK WATERBORNE POLYCARBONATE (1K WBPC)

Strengths

- A development based on Mercedes Benz clear top coat body paint
- Highest wear resistance of any waterborne (except 2 pack Polycarbonate)
- Low toxicity, low VOC
- Non-yellowing
- Suitable for interior and exterior – UV stable
- Edge bonding resistant
- Quilting resistance
- Breathable
- Mild odour
- ATFA Innovative Product of the Year Award

Limitations

- Paler timber colours than solventborne. New waterborne Oil Modified Urethane will give solvent coating timber colours.
- More expensive than solventborne coatings

TWO PACK WATERBORNE POLYCARBONATE (2K WBPC)

Strengths

- A next generation super tough coating based on scratch resistant European Automotive Technology
- More recently enhanced with a non-isocyanate hardener that further improves durability
- Very high wear resistance – Taber loss as low as 3mg, CS17, 1kg, 1000 cycles – the best ever seen
- Low toxicity, low VOC
- Non-yellowing
- Suitable for interior and exterior
- Edge bonding resistant
- Quilting resistance
- Breathable
- Mild odour
- Sheen levels high gloss to flat natural

Limitations

- Paler timber colours than solventbornes
- More expensive than solventborne coatings

SEALERS

Type	Considerations
Use build coat as sealer or first coat	3 full coats in a 3 coat system
Fast dry sealer	• Low solids and lower film build – closer to a 2.5 coat system • Improved productivity – first 2 coats applied on day 1 • Highest toxicity of any solventborne coating (can contain Toluene and Ketones) • Highest flammability (beware pilot lights!) • Will lighten timber colour compared to MCPU, 2KSPU and SUMO build coat used as first coat • May darken timber compared WB coatings • May assist Edge Bonding
Temptation to use one brand of sealer with another brand of build coat	• Will void warranty – mixed system! • May get no manufacturer technical support if problem occurs

U.V. CURE COATINGS ON PREFINISHED AND IN-SITU FLOORING

SOLID, ENGINEERED, HYBRID, AND VINYL PLANK

Strengths

- Increased in-situ UV cure emerging. Most is factory prefinished
- Prefinished is ready to install so install time to occupancy may be only days - convenience
- No within-building toxicity or VOC concerns
- Generally good durability wear resistance as coatings are Urethane Acrylate and often ceramic or oxide reinforced
- Cost competitive with in-situ installed and coated timber flooring
- Pristine surface free of imperfections at installation
- UV coated timber is suitable for floating or direct stick installation
- New technology in LED Cure Hard Wax Oil Engineered flooring

Limitations

- Coatings often brittle and can scratch easy
- Micro-bevelled edges can pose a recoating problem
- Due to high flatness of the factory finished surface, can have a ‘plastic’ look
- Individual board damage difficult as masking, repair and recoat will give a different aesthetic

RECOATING EXISTING SOLID AND ENGINEERED FLOORS

Considerations

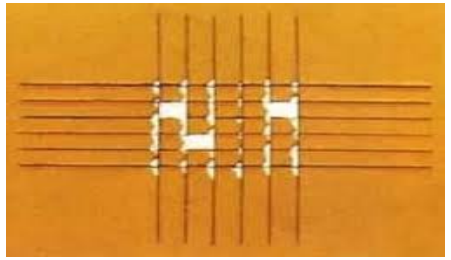
Consider the surface to be coated as an ‘unknown’ and potentially contaminated:

- Wet scrub to remove film forming contaminants that will not be effectively removed by solvent wipe or even-sanding (may smear the contaminant)
- Test Patches are a must for any recoating - conduct by simulating the intended process
- If having a bevelled edge, simply abrading the surface may lead to a white ‘tram line’ in the bevelled edge recess due to lack of bonding within the recess
- Some coatings are chemically incompatible, e.g. MCPU and Hardwax Oils. They may even flow and look OK when wet, but when dry they may delaminate / peel. Others may reject or orange peel when wet (workshop 2 will explain why in some detail).

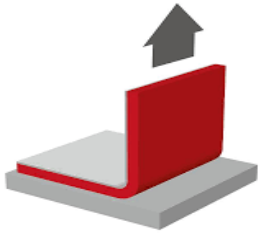
COATING ADHESION TESTING

Adhesion failure is perhaps the most costly form of floor failure as rectification involves a full resand back to bare timber.

Cross Hatch Test - ASTM D3359 / AS 1580.408 Adhesion by Tape Test



Score parallel lines 1 mm apart and again at 90 degrees

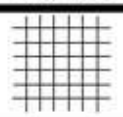
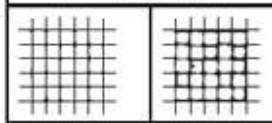
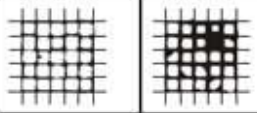
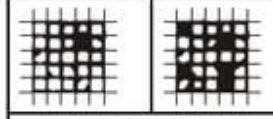


Rub 3M Magic Tape into surface and pull off at 90 degrees.- examine surface for rating (next slide)

Moisture Cure Polyurethane over Oil Modified Polyurethane - incompatible

CROSS HATCH ADHESION RATINGS

TEST METHOD ASTM D 3359 AND AS 1580.408

Surface	Description	ISO	ASTM
	The edges of the cuts are completely smooth; none of the squares of the lattice is detached.	0	5B
	Detachment of flakes of the coating at the intersections of the cuts. A cross cut area not significantly greater than 5% is affected.	1	4B
	The coating has flaked along the edges and/or at the intersections of the cuts. A cross cut area significantly greater than 5%, but not significantly greater than 15% is affected.	2	3B
	The coating has flaked along the edges of the cuts partly or wholly in large ribbons, and/or it has flaked partly or wholly on different parts of the squares. A cross cut area significantly greater than 15%, but not significantly greater than 35%, is affected.	3	2B
	The coating has flaked along the edges of the cuts in large ribbons and/or some squares have detached partly or wholly. A cross cut area significantly greater than 35%, but not significantly greater than 65%, is affected.	4	1B
	Any degree of flaking that cannot be classified even by classification 4 (1B).	5	0B

COATING HARDNESS – REFER ATFA INFORMATION SHEET #86

Hardness is the capacity of a coating to resist scratching, marring and gouging by the ability to resist plastic deformation (marking) by impact or sliding.

In general practical terms a soft or low hardness coating will be more prone to:

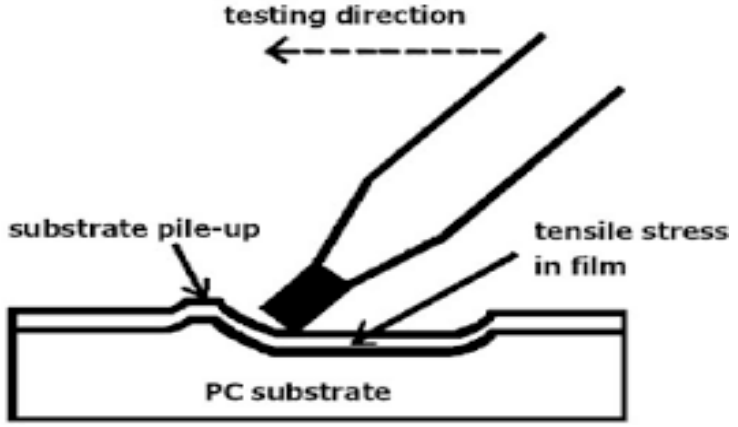
- Rapid wear
- More scuffing / marring and marking from dragged objects
- Often lower chemical resistance (less cross link density)
- Increased tramlining

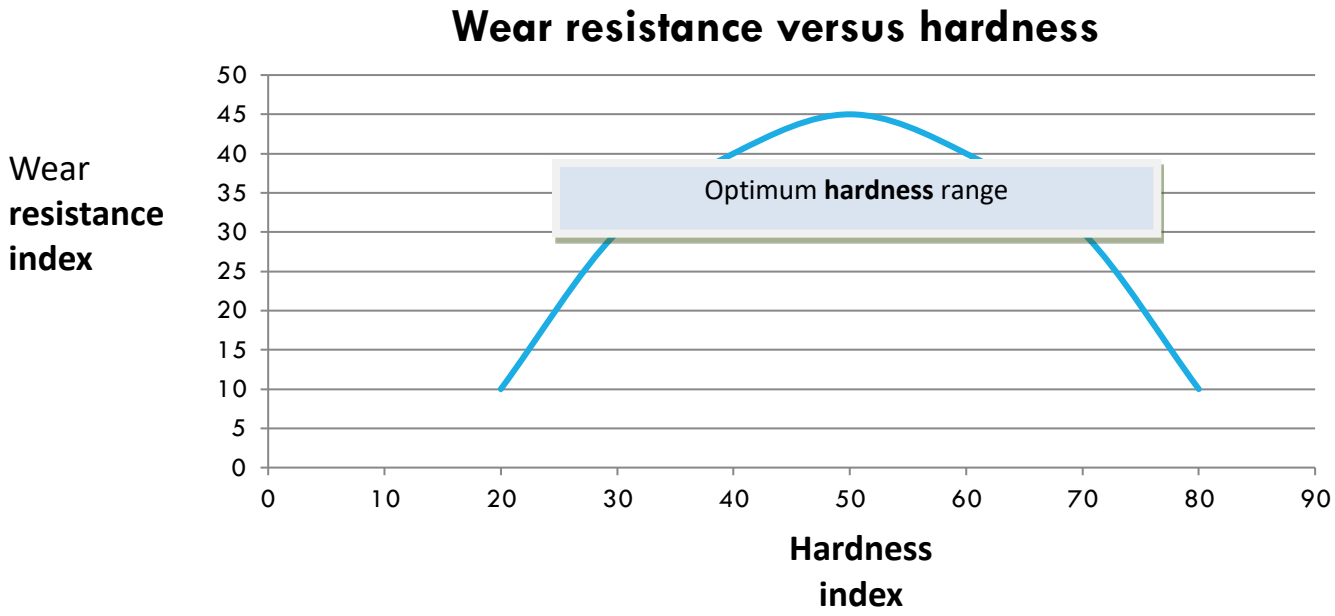
A hard coating will be more prone to:

- Brittle fracture from dropped objects
- Increased wear resistance
- Improved chemical resistance

OPTIMUM HARDNESS
THE PENCIL HARDNESS

- **ASTM D-3363-00 AND ISO- 15184**





Pencil Hardness	Qualitative Rating	Film Description
HB –H	Poor	Soft film. Prone to rapid wear and ease of scuffing
2H – 3H	Fair	Moderate performer
4H – 5H	Good	Durable film with projected good wear
6H – 7 H	Fair	Brittle, prone to scratching

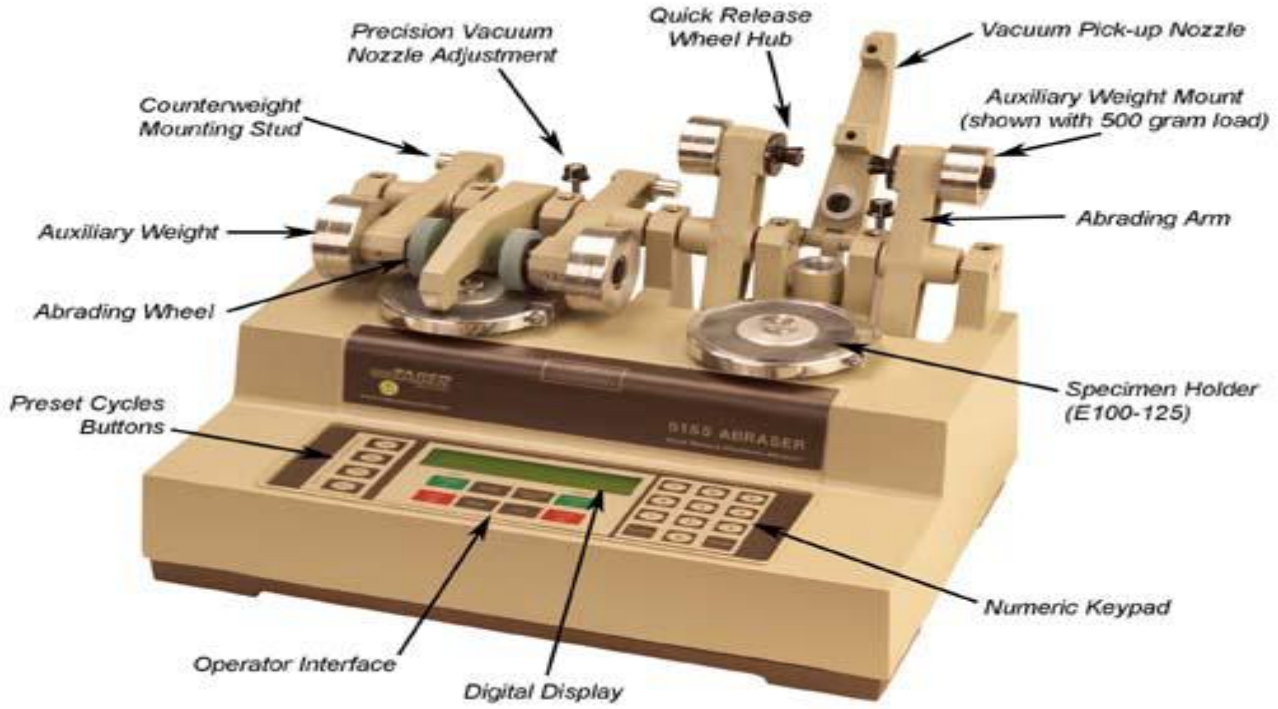
THE TABER ABRASER

THE INDUSTRY STANDARD FOR ACCELERATED WEAR RESISTANCE

Referenced by many International standards:

ASTM, DIN, EN, Federal Spec, ISO, JIS Military Spec, SAE, etc.

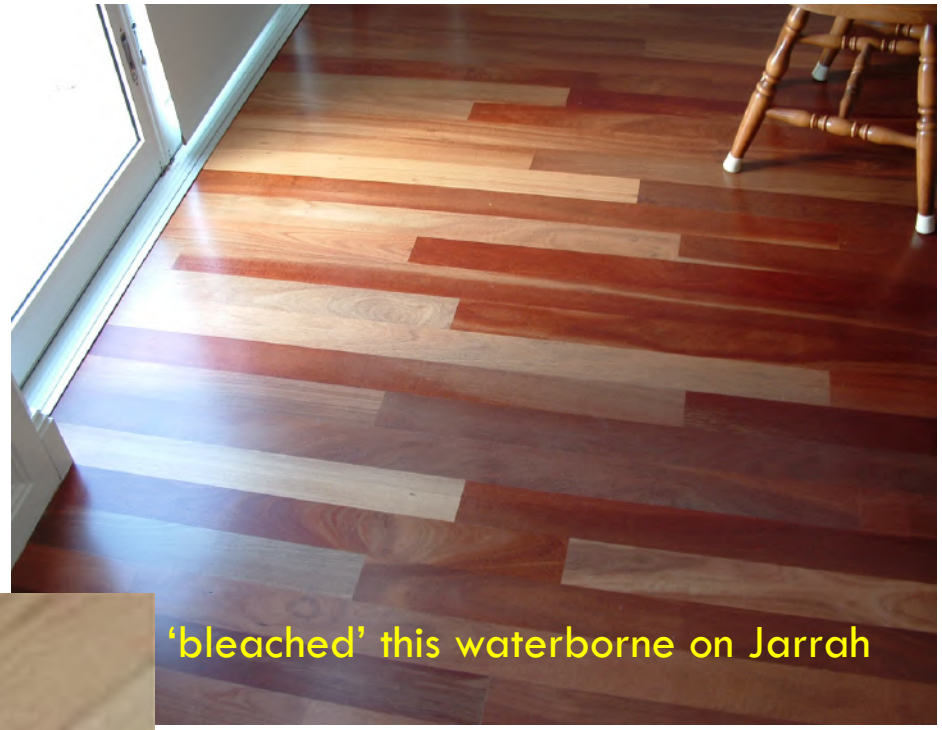
Rotating table, two counter self rotating grindstones (e.g. CS17), applied at specific pressure (e.g. 1 kg), for certain revolutions (e.g. 1,000)



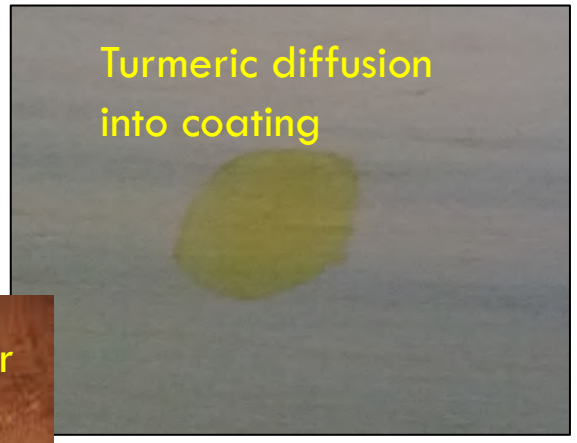
COLOUR CHANGE

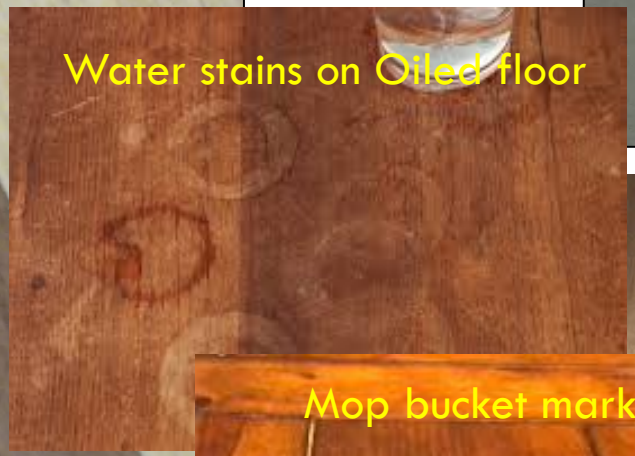
Two considerations:

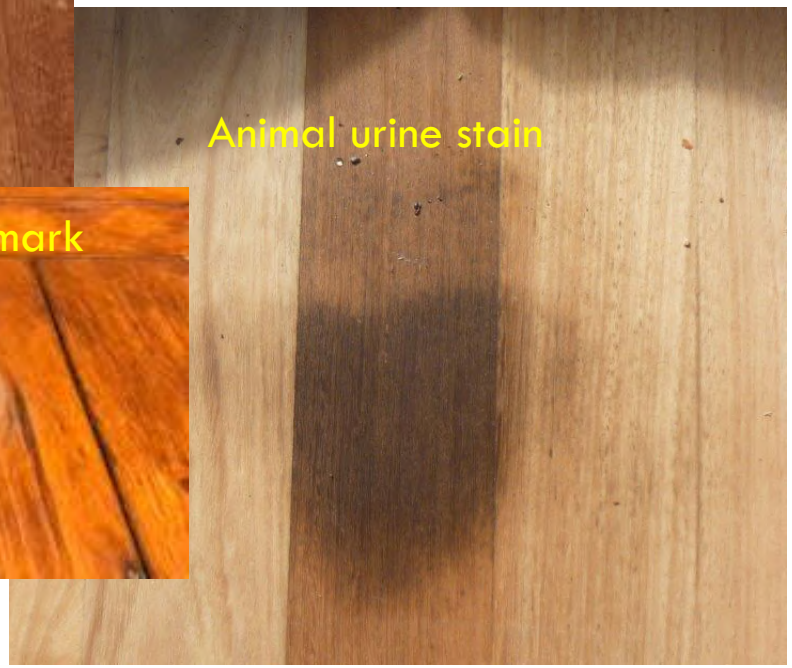
- Coating type
- Action of UV radiation on coating and / or timber



SPILLS, DRIPS AND SPRAYS







This raises the whole question of Chemical Resistance of Coatings (next slide)

CHEMICAL RESISTANCE

Good chemical resistance is explained from the physical chemistry of the polymer coating.

High cross link density is the most important attribute for high chemical resistance (explains why 2 packs out perform 1 packs of the same polymer type). Moisture Vapour Transmission rate equates to Solvent Transmission Rate in general

Chemical Resistance	Ranking
High  Low	• 2 pack solventborne Polyurethane • Moisture Cure Polyurethane (MCPU) • 2 pack 100% Polycarbonate waterborne (2KWBPC) • 2 pack 100% Polyurethane waterborne (2KWBPU) • 2 pack hybrid Urethane acrylate • Oil Modified Urethane solventborne (low oil to urethane ratio) • Urethane Modified Oil (high oil to urethane ratio) • 1 pack Polycarbonate waterborne (1KWBPC) • 1 pack 100% Polyurethane waterborne (1KWBPU) • 1 pack Urethane Acrylate waterborne • 2 Pack Hard Wax Oil • 1 pack Hard Wax Oil • Penetrating Oil

WET SLIP RESISTANCE – AUSTRALIAN STANDARDS

AS 4586:2013 for new surfaces

- P rating is from a laboratory oiled ramp test – relates to the angle a person in standard footwear slips on an incline. Refer next slide.
- Pendulum test – the only test applicable to on-site assessment

AS 4663.2013 for existing surfaces

- Pendulum test only is applicable. P classifications do not apply. SRV (Slip Resistance value) applies. Refer later slide.

Building Codes of Australia, BCA 2014 Vol 2 clause 3.9.1.3 for Stair Treads

- P3 / R10 for dry treads, P4 / R11if intermittent wet
- For slip injury incidents then the surface is an existing surface and the AS 4663 Pendulum test is used for assessment

TABLE 3B FROM HB 198

GUIDE TO SLIP RESISTANCE OF PEDESTRIAN SURFACE MATERIALS WHERE NCC DOES NOT SPECIFY SLIP RESISTANCE. P RATING COMPLIANCE IS RELATED TO AS4586

Location (selected areas)	Wet Pendulum P Rating
External pavements and ramps - slope greater than 1:14	P5
- slope less than 1:14	P4
External balconies, colonnades, carports, pedestrian crossings, driveways and others	P4
Undercover car parks	P3
Hotels, Offices, Public Buildings, Schools and Kindergartens	
- Wet areas	P3
- Transition areas (intermittent wet)	P2
- Dry areas	P1
- Toilet facilities	P3
- Kitchens and laundries	P2
Supermarkets and Shopping Centres	
- Fast food outlets, food courts and dining areas	P3
- Fresh fruit and vegetable areas	P3
- Entry areas with external access	P3
Loading Docks, Commercial Kitchens, Cold Stores, Serving Areas	
- Undercover docks and commercial kitchens	P5
- Serving areas behind bars, cold stores and freezers	P4
Swimming pools and Sporting Facilities	
- Ramps and stairs leading to water	P5
- Pool surrounds and communal shower rooms	P4
- Undercover concourse areas of sports stadiums	P3
Hospitals and Aged Care Facilities	
- Bathrooms and en-suites	P3
- Wards and corridors	P2

THE PENDULUM TEST

AS4586-13 AND AS 4663-13 APPENDIX A

Rubber Slider

Method based on a swinging imitation rubber (standardised rubber ‘slider’ used) heel that sweeps over a surface to be tested.

Slider 96 type	Assesses
Slider 55 (softer rubber)	Barefoot areas
Slider 96 (harder rubber)	Shod pedestrians

The resistance to the ‘sliding’ or slipping over the test surface is given as a ‘SRV’ (slip resistance value). Assessed as ‘slip potential’ per the table for as 4663 or a P rating per as 4586 (refer next slide)

Classification	SRV
High Slip Potential	0 - 24
Moderate Slip potential	25 – 35
Low Slip Potential	36 +

TO SUMMARISE ~
WHAT TO TAKE FROM THIS WORKSHOP

1. **We have a Duty of Care** to listen to our customer and elicit what exactly they want to happen with their floor.

   Document on the quote what is agreed to and have the customer sign off on it.

   There are potential legal consequences if we do not deliver the contracted outcome.

2. **Offer choice** - A contractor may have their 'favourite' coating but there may be another option that best satisfies the customer's expected outcome.

3. **Keep up with technology** - this requirement is a legal Duty of Care expectation of a 'Deemed Professional' which every contractor is.

   Technology is always advancing. Recent years has seen advances in 2-pack hardwax oils, polycarbonate waterbornes and isocyanate-free hardeners.

4. **Make use of ATFA resources** to achieve the above. Webinars, seminars and workshops. Make use of the 'ATFA Coatings Hotline' on tamsaconsult@hotmail.com or 0414 793 237

WORKSHOP 2 OUTLINE

In detail we will examine in depth, the identification, what actually causes the condition, how to avoid and rectification options of some coated surface issues including:

- Contamination
- Cob-webbing
- Ghosting
- Rapid wear
- Blooming
- Gloss variation
- Pitting
- Rejection
- Frying
- Delamination
- Cobwebbing
- Orange peel

Once again coating choices could play a part as well as other factors such as timber type, environment and work method.

AUSWOOD

PREMIUM FLOORING SOLUTIONS

Brumby Range 5G

Brumby Range LUX

enviroFLOOR Premium

enviroFLOOR premium

enviroLUX

enviroLUX

STOCKMANS RIDGE PREMIUM

STOCKMANS RIDGE