TEKNOS

Paint with Pride

Coating innovation?

BWF MEMBERS' DAY

BWF Members Day

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Why paint exterior joinery?

Performance

- Protection of timber surface
  - Discolouration
  - Mould growth
  - Tannin staining
- Reduces short term dimensional change
- Limits surface checking and splits

Marketing

- Vast colour options
- Bespoke colour schemes
- Wider colour and surface effects than competitor materials such as Upvc

How much coating innovation is there?

In one sense very little!

- The basic film forming resins, Alkyds, Epoxies, Acrylics and Urethanes have been around for decades
- Most were developed by the chemical industry for non paint end uses
- The paint industry is a small users of mainstream resins

So what do the paint companies actually do?

- They blend commercially available resins, pigments, solvents (including water) and additives into a paint which can be sprayed, dipped, flow coated or brushed onto timber
- As the paint dries, it leaves behind a protective film
- Paint manufacture is similar in many ways to cooking … ***but there are good cooks and bad cooks, and the quality of the ingredients makes a difference!***

Water based acrylic paints: the biggest innovation the last decade

Traditionally, Solvent Based alkyd paints were the workhorse of timber coating

- Usually white spirit based
- but too slow drying for factory use
- Lose flexibility on ageing, leading to cracks and flakes
- Service life on timber: 2 to 4 years
- High VOC

Acrylic resins proved an ideal solution for factory finished joinery

- Dry quickly
- Remain flexible on ageing
- Good colour stability
- Service life on timber: 5 to 10 years
- Easy to formulate using water as the solvent: low VOC

So is that it for paint innovation?

Actually no!

Even properly applied acrylic coatings don't solve every problem, but …

Paint companies have largely stopped marketing "miracle" solutions

- *clear coatings on oak*
- *15 year maintenance free warranties*
- *knot blockers etc.….*

and have started to:

1. try to understand why problems occur
2. work with other industry suppliers of: timber, tooling, glazing and ironmongery, to design out weak areas and processes
3. develop more robust products and systems
4. Work with the joinery industry and its representatives to set Standards for best practice design

BS EN 644 is key to optimising coating performance

BS EN 644 best practice helps eliminate the weaknesses in processes and design which lead to premature coating breakdown and high maintenance frequency

Some examples

- Drying and curing
- Substrate stability
- Moisture content and dimensional movement
- Performance by design

Watching paint dry

Water based acrylics dry and cure in a three stage process

1. Surface dry ~ 4 hours
2. Coalesce ~ 4-8 hours
3. Cure several days

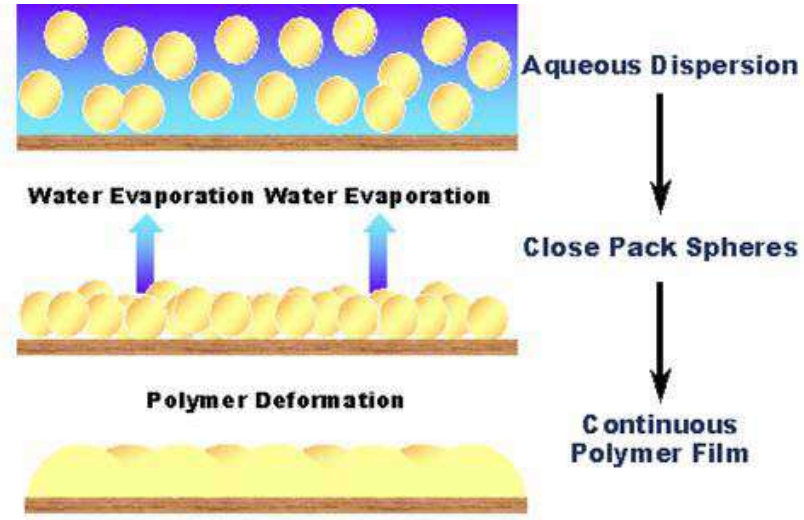
The process is heat and airflow dependent

Joinery which is dry to handle may not be fully cured leading to blistering and water spotting on site

Relative humidity is not a good guide to drying conditions

- at 50% RH in summer (20°C) there is still enough energy to remove 8 g/m³ of water to atmosphere
- at 50% RH in winter (5°C) the energy available would remove 3 g/m³ of water

The drying process



Drying best practice

Liquid temperature is more important than air temperature

- energy transfer from air to liquid is much less efficient than energy transfer within the much denser liquid
- at a given temperature a liquid has much more energy than a gas

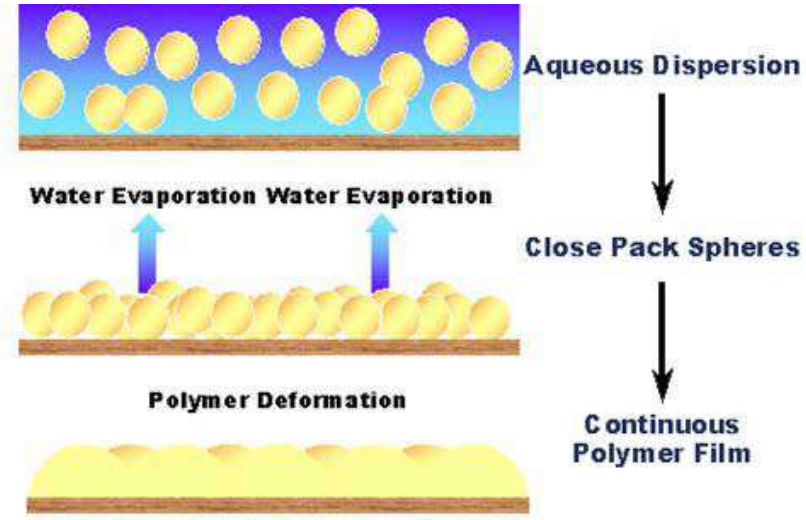
Air flow can be more important than temperature

- water vapour concentration greatest near the liquid surface
- relative humidity is higher at the interface

Hence our emphasis on:

- keeping the paint warm
- maintaining even temperature in the drying area in preference to forced air driers
- using fans for air movement

The drying process



Substrate stability

Substrate stability is a key factor in joinery performance

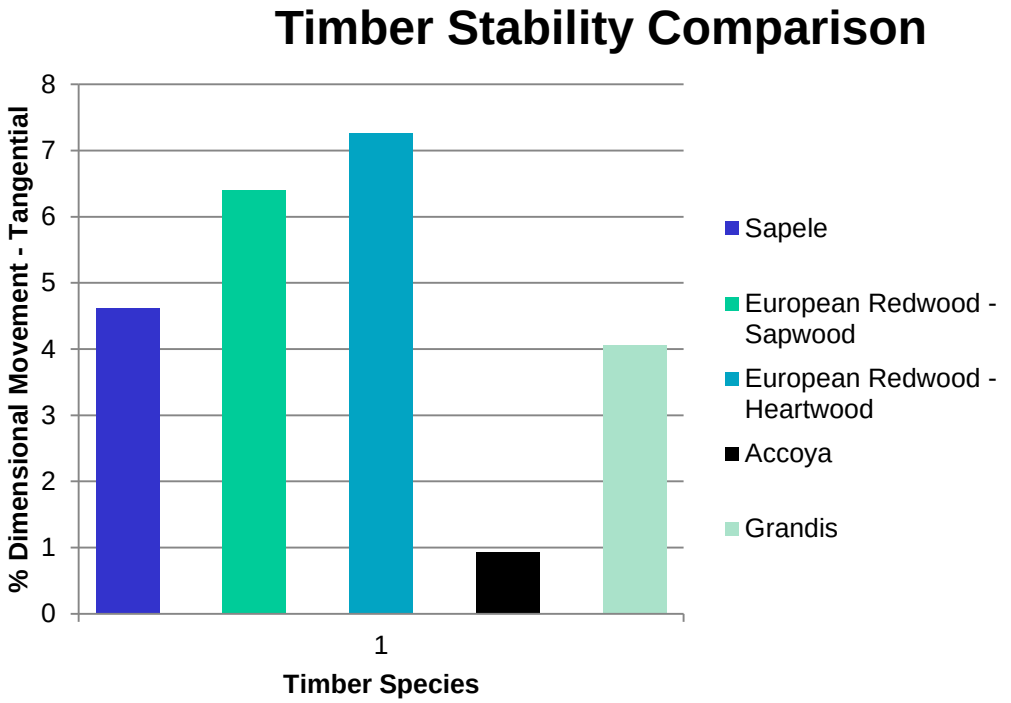
- Opening of joints
- Swelling and sticking

Control of moisture content is one factor

- initial conditioning on site

Less stable timbers mechanically stress on the paint film over time

- analogous to bending and unbending a spoon
- Micro fracturing and hydrolysis



Moisture Content and Dimensional Movement

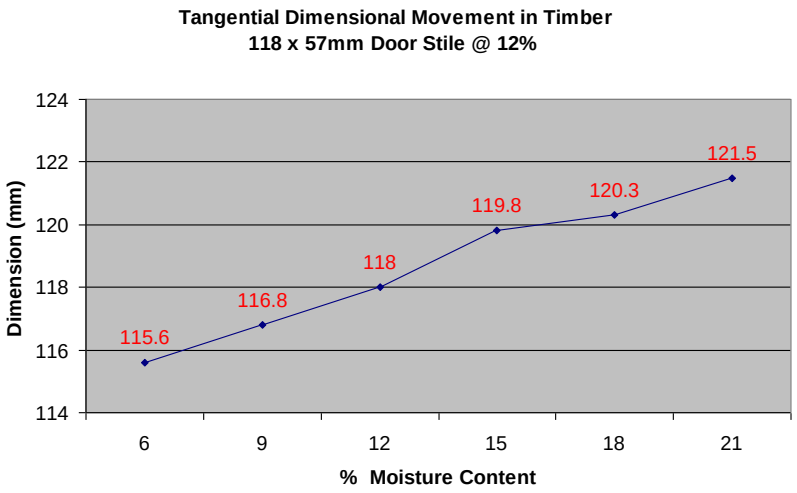
- Correct Moisture for End Use

  External 12 – 19% BS EN 942:2007

- Fibre Saturation Between 25 to 30%; full Saturation above 30% with cells full of water
- Below Fibre Saturation Point - Wood Shrinks and Swells
  - Tangential Movement:

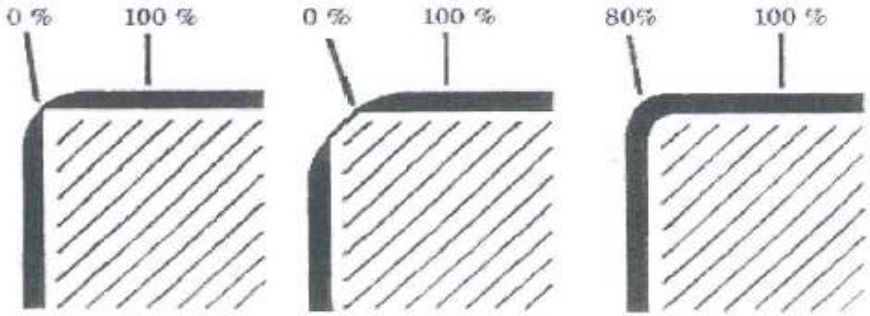
    3% Moisture = 1% Dimension
  - Radial Movement:

    3% Moisture = 0·5% Dimension
- Moisture content when Received, Machined, Coated and Delivered
- Wet Rot occurs when moisture content is sustained above 22%

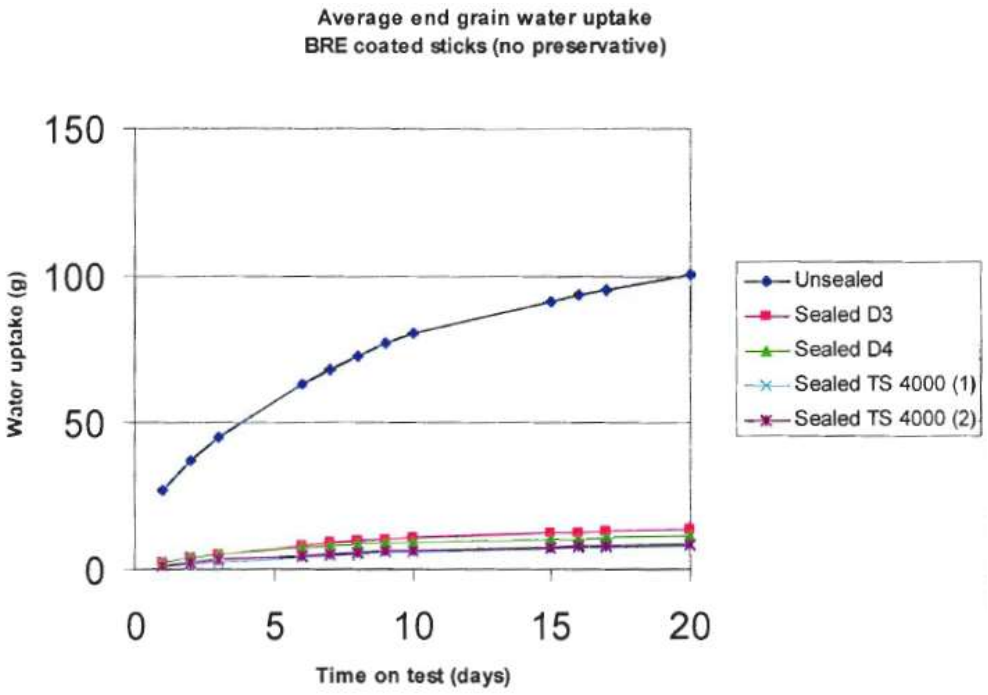


Performance by Design

- Water Shedding Angles: 9^{o} minimum
- Extended Cills: minimise and stabilise joint
- Sharp Edges – Minimum 3mm Radius
- Break Joints: Differential movement between components
- Glazing: Prevention of moisture ingress!
- Bottom rebate detail: How is moisture managed?
- Tooling supply, design and maintenance



… and there are also some innovative Coating products



- **Teknoseal 4000 end grain sealer:**
  - requirement of BS EN 644
- **Aqua Primer 2907 Combi Primer:**
  - meeting the performance requirements of BS EN 599-1
  - Registered under the Biocidal Products Directive (BPD)
  - Faster production throughput
- **Teknosafe 2407:**
  - Euroclass B Fire Certification for latest standards under CPD

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Thank you!

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