Avoiding Paint Problems on Exterior Joinery

Research at Herriot Watt University has shown modern, factory coated, timber window frames, featuring best practice design and fabrication have, an expected service life of up to 60 years in the British climate. In most low-rise buildings they offer significantly lower lifetime cost than plastic or metal frames, and they come with an A+ environmental rating.

Timber windows and doors, factory coated with modern, water based, paint systems only require repainting every 8 to 10 years in ‘typical’ UK conditions, and with regular maintenance, painting is only necessary to refresh appearance and top up protection.

Many factors influence maintenance schedules, but in practice most early maintenance is due to excessive moisture penetration and can be prevented.

This note discusses how common problems can be avoided.

**Milking and blistering**

Usually seen soon after exterior joinery is fitted and often in cold, wet, conditions. Though most water based paints are typically dry to handle and overcoat within a few hours, it takes longer for all the water within the film to evaporate and up to seven days for the paint film to fully cure. Early exposure of painted joinery, particularly in damp, cold conditions, can cause the paint to blister and translucent finishes to look ‘milky’. Typically, as the weather improves and the paint fully dries and cures, these defects disappear without further treatment.

Keeping the paint warm and maintaining good airflow and moderate temperature in the drying area are key to avoiding these problems, so leave fans and background heating on overnight in the drying area particularly during cold weather.

In winter, an extra day in a well-ventilated and moderately heated drying area will eliminate most problems.

**New Build**

Wet work, such as plastering and floor screeding, can cause problems when windows and door sets are fitted before internal work is complete.

Typical screed slurry is a mix of 10:1 water to solids and, as it dries, this water can escape through wooden frames, causing blisters under the external paintwork. The problem is worse in winter when the inside areas are heated, the windows closed and the building poorly ventilated.

This is not a joinery or paint fault and can be avoided by properly ventilating the building and using dehumidifiers in critical areas.

**Extractive staining**

Soluble tannin and oily resins, which are naturally present in timber, are the main causes of timber staining. Tannins cause staining in hardwoods and around softwood knots, whilst resin exudation is more prevalent in softwoods, particularly, though not exclusively, around knots.

**Tannin staining**

Most tannin are water soluble, so moisture is a major factor in tannin migration. When dry joinery from the factory is exposed in wet or humid conditions, the rapid uptake of moisture mobilises the tannins and heat and sunlight draw them to the coating surface.

Many hardwood species have high tannin content, but stain inhibiting or blocking primers provide an effective solution in most cases provided the paint system has fully cured before initial exposure. For hardwood joinery, extra drying, before new windows are fitted, is recommended in cold, wet or wintery conditions to ensure the paint is fully cured.
Resin bleed

Resin is naturally present around knots or in ducts or latewood bands within the timber. It is not water soluble but preservative solvents and heat, causing it to change from a solid to a liquid, and in severe cases to a gas. Resin bleed is often seen on southern elevations and under darker coating colours, which absorb more heat from the sun.

Selecting knot free or laminated timber is the best way to avoid resin bleed. Filling the knots with an exterior filler, sealing with knotting solution, and over-coating with a specially formulated isolating primer will help minimise knot staining, but will not prevent resin bleed.

If bleed occurs, do not try to remove fresh sticky resin since exudation may still be active. Let the resin weather until it dries to a white crystalline powder then remove it with a stiff brush, gently washing off any remaining residues with methylated spirits. Immediate re-coating may be unnecessary, since permeable water based coatings often allow the passage of resin to the surface without damage to the coating itself.

‘Best Practice’ Design

Moisture penetrating joints and seals is the cause almost all premature coating breakdown. Good assembly and design will eliminate most problems and following BS EN 644, which sets out best manufacturing practice for exterior joinery, is an excellent starting point, particularly in our wet climate.

Critical points to look out for are:

- Exposed end grain, readily absorbs moisture, causing discoloration and reducing the adhesion of the coating system. A full glue joint will protect end grain within a joint, but seal all exposed end grain with two coats of Teknoseal 4000 and fill construction and mitre joints with either Gori 691 sealer or MS 524 adhesive/sealant. This will substantially reduce end grain moisture uptake and extend coating life.

- Ideally, windows and doors should be set back from the face of a building. Avoid projecting cills, but where present, cills and non-vertical surfaces must show efficient water shedding, with a slope angle of at least 9°.

- Surface tension causes paint to flow away from sharp edges. A minimum radius 3mm is required on external and 1.5mm on internal edges to avoid thinning of the coating system.

- Joinery design should exclude obvious water traps, and any gaps or recesses be sufficiently wide to prevent capillary draw of water; typically we recommend a 3mm gap.

- Fixing pins, must not allow water ingress. Secret nailing is a good solution; but if pins are punched below the surface, they must be filled to prevent water ponding and secondary filling may be necessary to account for shrinkage.

- Horizontal glazing beads are a common weak point, with splitting, twisting and warping of the bead breaking the integrity of the glazing joint, allowing water to flow off the glass, penetrate behind the bead and enter the glazing rebate. Stable, water resistant wood composite beading is an increasingly popular way of eliminating these problems, while setting beads on a bed of MS 524 adhesive/sealant will help prevent water penetration.