

# Resin staining & exudation

## Good joinery practice

In addition to soluble extractives, the cell structure of wood contains groups of chemicals, often referred to as exudates. In softwoods, the principle exudate is referred to as resin. This can show itself in coating discolouration, viscous liquid or crystalline solids on the surface of the timber or coating, or a combination of both.

Resin staining and exudation is commonly seen at knot margins, but is also found in resin ducts and sometimes on latewood bands. Influencing factors include timber species, age, growth conditions, season of harvest, the ratio of sapwood to heartwood and the number of live knots.

The staining associated with resin is chemically different from the tannin stains of hardwoods and many hardwood isolating primers offer relatively ineffective protection against resin staining.

Resin exudation is usually initiated by a combination of heat and moisture, which changes the resin from a solid to a liquid and in severe cases to a gas. Common initiators in joinery processing include drying equipment, heated storage, stretch wrap packaging, and heating systems in buildings post fitting.

In service, specific weather conditions can trigger the problem and discolouration will occur most rapidly on warmer southern elevations when humidity levels are high. Darker coating colours that absorb more energy may initially disguise staining. However, this can accelerate resin migration leading to blistering and adhesion failure.

Preservative solvents can also be a factor. If insufficient drying time is allowed, residual solvent that has absorbed resin, colour and natural extractives from the timber can discolour subsequent coatings. The problem is often seen around knots, where the preservation fluid will partly dissolve resin concentrates. This brings them to the timber surface, producing severe staining and blistering even when knotting solution is used.

To reduce the problem, allow sufficient drying time between preservation treatment and subsequent coating or switch to a surface applied, water based preservative such as **TEKNOL AQUA 1410**. Preserved timber will dry faster if air is allowed to circulate the surface of the substrate, and stacked timber should always be separated with spacing bars.

## Solutions

There is no foolproof solution to the problem of resin exudation, although timber selection to exclude knots from decorative surfaces is increasingly common and effective. Finger jointing or laminating can offer an economic route to knot free surfaces and with careful selection of basecoats,

an aesthetically pleasing result can be achieved even with translucent finishes.

When an opaque system is required, our preferred method involves filling and sealing the knots with **TEKNOFILL 5001** fine surface filler, sealing the knot area with a knotting solution, and over-coating with a specially formulated isolating primer such as **KNOT INHIBITING PRIMER 5200**. This system will not prevent the exudation of liquid resin in extreme cases, but has proved to be highly effective in minimising resin stains and restricting the affected areas.

Other common coating solutions include:

1. Primers with barrier pigments such as leafing aluminium, offer fairly effective short-term protection against staining. However, they only delay the exudation process and because they embrittle the film, it can lead to other failures.

2. Two pack epoxy and polyurethane coatings form a dense coating layer that encapsulates the timber, restricting movement of extractives and resin through the paint film. Short term, these coatings offer good protection but pressure from resin exudation can, over time, push these coatings off the timber surface, leading to total adhesion failure.

## Resin exudation remedial measures

When resin has exuded through a permeable coating, the best remedial treatment is to allow the resin to weather until it dries and oxidises, forming a white crystalline powder. The dried resin can then be removed with a stiff nylon or natural bristle brush, and any remaining residues washed off with a cloth.

Water based coatings with their relatively high degree of moisture vapour permeability are more likely to allow the passage of resin to the surface without damage to the coating. If the finish is not damaged by over-vigorous scrubbing during crystal removal, re-coating is often unnecessary.

Although it may be unsightly, it is better not to remove fresh sticky resin. In practice, this can be very difficult and the presence of sticky resin indicates that the exudation is still continuing. The remedial work for resin exudation is often best left until the first maintenance period, by which time the resin has normally fully crystallised. After removal as described above, the overall application of one maintenance coat of finish restores the general appearance of the timber and maintains its protection.