

The Coating of Modified Timber

Introduction

Attractive, darker colour shades represent a positive side-effect of thermal modification. Should they be preserved (cf. Fact Sheet "TMT Colour Shading Stability", TMT.04) or should the timber additionally be protected, surface finishing must be taken into consideration.

The same principles as applicable to natural wood apply to modified timber.

- The type of coating is to be selected with view of its purpose of use, of the stress it is exposed to and of the wood species.
- The thinner the coating, the lower its protective effect, the shorter is the maintenance interval, but the easier is maintenance.
- Increasing requirements of dimensional stability require higher layer thickness.
- Blanks in thick coating may reverse the protecting effect (cases of wetness).

Owing to modification, coating can be affected as follows:

- a more hydrophobic surface (larger contact angle),
- reduced wettability and water intake capability,
- reduced pH value,
- possibly modified surface hardness,
- higher surface quality (planing) and
- lower swelling and lower tendency of fibre turning upright.

The Coating of TMT for Use in Interior Design

Many end-users expect TMT colour shades to be permanent, since TMT is technically modified timber; this applies to products intended for use in both interior and exterior applications. Investigations performed at the IHD (Beyer 2010) have confirmed that the colour shades generated by thermal modification are not resistant to light. Therefore, it is recommended to apply light-protective measures to surfaces of TMT products intended also for use in interior design.

The higher the intensity of treatment, the more and darker, but light-sensitive compounds are formed. Therefore, the bleaching effect due to irradiation becomes more apparent. One advantage of TMT is, however, that the darker colour shades very simply permit the application of certain, darker colour pigments as reasonably-priced and proven light-protecting agents.

It was also found out at the IHD that traditional light-protecting agents developed for light-shaded timbers do not work with TMT, even causing strong modification in colour, preferably greying, in certain cases. A light-protection concept developed at the IHD especially for thermowood has started to show very good results in interior conditions. This light-protection concept consists of an impregnation with an additive that reacts either as a deactivator or stabiliser, possibly complemented by colour-shading additives in the coating. The development of coatings for exterior use based on that concept is in preparation.

The Coating of Windows Made of TMT

It is also highly recommended to provide wooden windows of TMT with coating. A coating system to be applied to a specific TMT should be tested for fitness and adapted, if necessary.

Tests conducted at the IHD (Schweitzer 2007) of several coating systems revealed clear differences in quality. Variants of thick layers showed better results, in general, in comparison to variants of medium-thick layers (varnish and opaque), so that it appears not advisable to omit intermediate coating. The application of natural oils and waxes is possible; however, frequent care and maintenance are advised. Open-air weathering tests have so far not allowed any conclusions regarding differences with view of weather resistance of coatings on TMT in comparison with natural wood. Investigations of the degree of drying of water-based systems acc. to DIN 53150 have shown that they are applicable to TMT if the manufacturers' instructions are observed. But due to an extended time of drying, the risk of blocking must be borne in mind.

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Blanks, especially cracks or spray craters, form entrances for moisture and fungus spores to intrude. Due to the capillary transport of moisture with dark-coloured compounds in the longitudinal direction of the grain, discolouring may occur close to such blanks.

Protection against blue stain is highly recommendable since the thermal treatment does not provide for any preventive biocidal effect. A classical coating structure is recommended to be applied to wooden windows made of thermowood, consisting of impregnation, priming as well as intermediate and final surface coating.

Due to the very good surface quality after the mechanical processing of the window profiles, intermediate sanding may be waived when applying the coating. The very fine dust of TMT requires a high degree of cleanliness and good exhaust facilities with regard to both occupational safety and health and the risk of soiling parts that have already been coated.

The Coating of TMT Facade Cladding

As for façade cladding, the necessity of any coating must be checked. If it is desired or required, it should be applied in top quality; the same principles as applicable to wooden windows apply here. Regarding TMT, too, special care must be taken when reliably protecting narrow edge, preferably the end grain. Edge chamfering should be of a 2...5 mm radius. Oil-based systems may be of advantage when coating profiled boards.

Coating is recommended for multi-layered solid-wood panels (SWP) in order to protect glued joints at their wide and narrow edges against the intrusion of moisture. As investigations at the IHD (Weber, Krug 2007) have shown, insufficient quality of wood cannot be compensated by any coating. Hence, at least in the case of surface cover lamellas, very good quality of wood (low knottiness or fibre deviation) must be paid attention to. High-quality surface cover lamellas as rift/semi-rift will probably not be taken into account for cost reasons.

Conclusion

The same principles as applicable to natural species of wood apply to the coating of modified timber. Coating in interior design is recommendable for reasons of protection from light. In exterior applications it mainly serves, apart from aesthetic aspect, the protection from fading, moistening and infestation by blue stain. Hence, when coating modified timber, no concession should be made regarding neither the structure and manufacturing quality nor maintenance and care.

Several coating systems suitable for modified timber are available in the market. For the large variety of modified timbers characterised by the modification method, wood species and treatment stage and the modification of properties, the coating system must be tuned to the specific material. Manufacturers' recommendations must be observed for that purpose. In the event of uncertainty or of missing information or experience, the fitness of a coating system for a certain material should be checked; if required, the coating and the application methods must be accorded.

The main benefits of modified timber with regard to coating are the improvement in the swelling behaviour and enhanced surface quality. Drawbacks may be seen in its reduced wettability and adhesive strength. The modified pH-values regarding corrosion, discolouring and adhesion must be borne in mind.

Light-coloured and unpigmented forms of coating to be applied to modified timber are less recommendable. Strongly pigmented or opaque forms of coating offer themselves for use with TMT due to the darker shading it shows anyway. Hydrophobic forms of coating do naturally provide a certain protection against weathering and fading.

Despite its increased durability towards wood-decaying fungi, infestation by blue stain or mould or algae can be slowed down or reduced, but not prevented at any rate. If the protection of the surface is to be achieved or required, it can, in most cases, only be attained by applying suitable biocidal agents that may be suspended in the impregnation, priming or coating fluids.

Bibliography

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