

ACCSYS

A REPORT ON THE LONG-TERM
PERFORMANCE OF ACCOYA® WOOD



INTRODUCTION

This is a summary of a report assessing the condition of a natural exposure trial set up at the premises of Teknos (UK) Ltd near Swerford in Oxfordshire in March 2009, which ran for over 10 years.

The report was commissioned by Accsys Technologies Plc; it was assessed and written by BM Trada in 2019.

The aim of the trial was to test the long-term performance of different wood cladding profiles fabricated in three different substrates:

- Western red cedar
- Siberian larch
- Accoya® Wood

The report looked at the condition of the test rigs after 10 years and 9 days of uninterrupted natural exposure without any form of maintenance.

The three test substrates were used in conjunction with three cladding profiles and different levels of end-grain sealing at board ends as well as at intermediate joints designed to facilitate water bridging.

The report concluded that demonstrable performance benefits can be achieved, when used in association with good end-grain sealing practice and board profiles with rounded aris details which facilitate water shedding.

The report found that, when used in concert with Accoya®, the anticipated lifespan to first maintenance of a transparent medium-build stain finish can be extended by as much as three times compared to unmodified softwoods.

OBSERVATIONS

Consideration of the assessment data confirmed a superior long-term performance of Accoya® in virtually all respects compared to the unmodified Western red cedar and Siberian larch timber substrates. The assessments suggested that the performance aspects directly influenced by substrate stability (such as end fissuring, splitting and movements in nail fixings) exhibited the most significant levels of performance improvement when Accoya® was used.

The magnitude of the improvements shown by the use of Accoya® differed depending on the cladding profile which was used as well as the severity of exposure (e.g. west-facing as opposed to south-facing). The overall trends shown by the trial indicated that, where the cladding profile was least effective in shedding water and the severity of exposure conditions was high, the margins of performance improvement achieved by Accoya® increased.

In other words, the benefits of using Accoya® in the context of this trial were shown to be greatest when circumstances favoured rapid deterioration: Accoya® could provide a cladding solution far more tolerant of severe environmental conditions than conventional, unmodified, wood substrates.

The effectiveness of end-grain sealing

The product used to daub the fixing points and to seal the end-grain was Aquatop 2600 tinted to “Cypress” and applied on final completion of the test rigs. Consideration of the end fissuring showed a definite improvement in performance trends with increasing end-grain seal protection, and demonstrated the long-term performance benefits which can be gained through the expedient of end-grain sealing. The exposure rigs were designed in such a manner as to include joints within boards which, under most in-service circumstances, would constitute points of water ingress via exposed end-grain.

The joints were introduced at the mid-points of boards and these have encouraged water to be held within the joints by capillary attraction for prolonged periods following periods of rainfall. In all cases, one side of the joint has been left unsealed whilst the other has been given a single coat of end-grain sealer.

Demonstrable improvements in performance can be obtained when the end-grain of wood is protected against water ingress, even in scenarios where moisture is held against vulnerable end grain for prolonged periods following cycles of rainfall as a consequence of

capillary attraction and bridging due to the effects of surface tension.

In the case of the Western red cedar boards, the deterioration of the coating had progressed to the point where no protective function remained after 10 years’ exposure; whereas in the case of Siberian larch the functionality of the coating had been compromised although some residual function over the face of the boards remained. In the case of the Accoya® boards, apart from slight reductions in coating function along aris details, the coating has retained its full protective function.

Reactions at points of fixings

The Swerford exposure programme also sought to examine the reaction between the three wood substrates at the point of insertion of fixings. Two main types of reaction were found: either a localised splitting of the wood fibres around the nail; or of coating delamination around the nail head.

Splitting around fixings was predominantly observed in the case of Siberian larch whereas coating delamination was more often found on fixings driven into Western red cedar boards.

Often the wood fibres were seen to show evidence of compression

around the heads and shafts of the nails, indicating that the wood substrate had swollen around them. This showed that water had, in all probability, entered the substrate via the point of penetration of the fixing.

Cross-sectional profile and water runoff

In the case of Accoya®, virtually no disruption of the substrate or coating was observed after the ten year term of the exposure programme. Performance

of the coated cladding was not solely dependent on the relative behaviour and responses of the three substrates to the influence of climatic exposure but was also significantly influenced by the cross-sectional profile of the boards with respect to their ability to facilitate water runoff.

Demonstrable improvements in coating performance, from the standpoint of the reduction of aris failures, coating failure and maintenance requirement could be achieved by using of a profile which facilitated water

runoff as well as reducing the abruptness or severity of plane transitions by means of rounded aris details.

More fundamentally, a distinct performance “hierarchy” was seen to be established among the three substrates, where coating breakdown was consistently found to be most pronounced on Western red cedar boards and least evident on Accoya®, with Siberian larch assuming an intermediary position between the two.

CONCLUSIONS

The test programme provided an independent empirical evaluation of the improvements that using Accoya® as a substrate for exterior coatings, would be expected to offer.

BS 6150 “Painting of buildings” provides guidance on life expectations to first maintenance of exterior wood coatings. This Standard suggests that a semi-transparent exterior, medium-build wood stain (organic-solvent based and water-based) would be expected to achieve a typical life to first maintenance of between 3 and 5 years depending on the severity of exposure conditions when used on softwood boarding, cladding, bargeboards, soffits and fascias.

The exposure severity at the Swerford site, when categorised in accordance with BS EN 927-1 “Paints and varnishes – “Coating materials and coating systems for exterior wood”, was assessed as “Medium” for the West-facing return and “Severe” for the south-facing rigs. In this regard the anticipated longevity of the coatings applied to the south-facing rigs would realistically have been 3 years whereas those on the West-facing return might normally be expected to have a lifespan to first maintenance of 4 to 5 years.

Based on the observations from the

Swerford field exposure test programme it is evident that the performance expectations for Accoya® have been exceeded by a factor of at least 3-fold, meaning that the anticipated lifetime to first maintenance in a severe exposure environment for Accoya® would be at least 9 years as a conservative estimate.

The fact that the trial has shown unequivocally that it is possible to achieve at least a threefold improvement in the lifetime to first maintenance of a translucent medium build coating has significant implications in terms of a reduction in ongoing maintenance costs, particularly on high-rise contracts where the combined costs of scaffolding and labour may be prohibitive.

These trials have shown that when a stable substrate such as Accoya® is used in concert with a cladding system which effectively sheds water and avoids sharp plane transitions (arises) and uses good site practice in terms of end sealing, significant performance benefits can be obtained.

Conclusions of this report can be summarised as follows:

1. The performance of translucent coatings as applied to the cladding boards in the exposure trial achieved

substantial improvements in longevity well beyond the performance expectations of the same coating when applied to conventional or unmodified wood substrates.

2. The use of Accoya® at the exposure trial as a material for finished cladding has shown that its use can extend the typical lifetime to first maintenance of medium-build transparent exterior wood stains by at least a factor of 3, meaning that its estimated lifetime to first maintenance in a severe exposure environment would be 9 or more years.

3. The test programme has shown that under the specific experimental conditions and protocols used for this exposure trial, the application of a sealer to the cut end grain of softwood cladding boards brings demonstrable benefits to the longevity of the boards in terms of reducing the incidence of end fissures or splits.

4. The use of a cladding profile designed to effectively shed rainwater and soften plane transitions such as the SA (Enhanced Shiplap) profile, when used under the experimental conditions of the trial brought about noticeable longevity and improvement in coating performance.



Timber Development UK was formed in 2021 by the merger of the Timber Trade Federation and the Timber Research and Development Association. After combining the membership of these organisations, Timber Development UK has more than 1500 members extending all the way from sawmill to specifier.

By bringing together the entire timber supply chain we aim to provide our members with the highest quality information, technical guidance and training to safely specify and design the timber structures of tomorrow, and create lower-carbon, higher quality, healthier and safer buildings using timber.

e: info@timberdevelopment.uk

w: www.timberdevelopment.uk

© Timber Development UK