



Heat-treated wood used at "de Oost Vaar Ders," a nature reserve in Netherlands

By
SJOERD BOS

Vice-President
Sansin



Heat-Treated Wood Offers Sustainable, Durable Exteriors

For centuries, burning lumber with an open torch made the wood surface more weather resistant in exterior applications. Vikings, for example, used to burn wood components to make their residential shelters, boats and ships, timber bridges, and farm fences more resistant to degradation.

The process of thermal modification, or heat treatment, upgrades lower durability softwood into wood products of constant quality. As early as the 1950s, research began in Europe on the thermal modification of wood based on its heat treatment at relatively high temperatures between 230° C-260° C (436° F-536° F).

This research led to advancements in thermal modification processes, to the point where even low-value wood species, such as beach, birch, poplar, and alder, could be modified to become value-added products and used safely for interior and exterior applications. There is a broad range of applications for heat-treated wood products, such as millwork, garden furniture, saunas, prefabricated houses, green houses, exterior decking, siding, cladding, flooring, and exterior joinery.

Changes to Thermally Modified Wood

When wood is thermally modified, or heat treated, the actual chemical structure and biological and physical properties of wood are changed. The main benefits gained by the heat treatment of wood

are reduced hygroscopicity (or moisture absorption), improved dimensional stability, and increased resistance to microbial attack and biodegradation without the use of toxic chemicals. With this treatment, builders get wood that is both dimensionally stable and resistant to rot and decay.

However, some side-effects can occur and those can include loss of strength and increased brittleness due to the high temperatures involved. As a result of the increased temperature during the heat-treatment process, some polymer bonds within the wood substrate (cellulose, hemicelluloses, and lignin) are affected. Lignin in the wood becomes especially prone to UV degradation and if not protected, the wood cells (mainly composed of cellulose) will become faded and loose, and subsequently the erosion of the wood surfaces is inevitable.

Traditionally these side-effects were cited as the main objections for the overall commercial utilization of heat-treated timber. More recently, two advances have served to counteract these side-effects.

One is that ongoing research and development of suitable thermal modification techniques focused on ways to optimize the heat treatment process for a maximum increase of the dimensional stability and durability, while minimizing the decrease in strength.

Second, it was discovered that when you properly finish and coat heat-treated wood, the longevity and durability of the thermally modified wood is excellent for both interior and exterior applications.

Maximize Durability and Stability with Coating

Under the direction of Dr. Nenad Vidovic, head of Sansin's research & development team, an extensive test was undertaken. Test panels were created using samples of heat-treated wood, modified according to different thermal modification technologies obtained from European and Canadian suppliers. Sansin's test results confirmed that without suitable coating, heat-treated wood is not weather resistant and is particularly susceptible to UV degradation.

As a matter of fact, initial fading, greying, and cracking on untreated samples were observed as early as seven days (on soft hardwoods) and up to 21 days (on pine species) after outdoor exposure.

As part of our research testing, a variety of low-build, solvent-based stains and oils were used to coat a variety of heat-treated wood panels. The results were similar, and the coating showed little improvement in the prevention of fading and cracking.

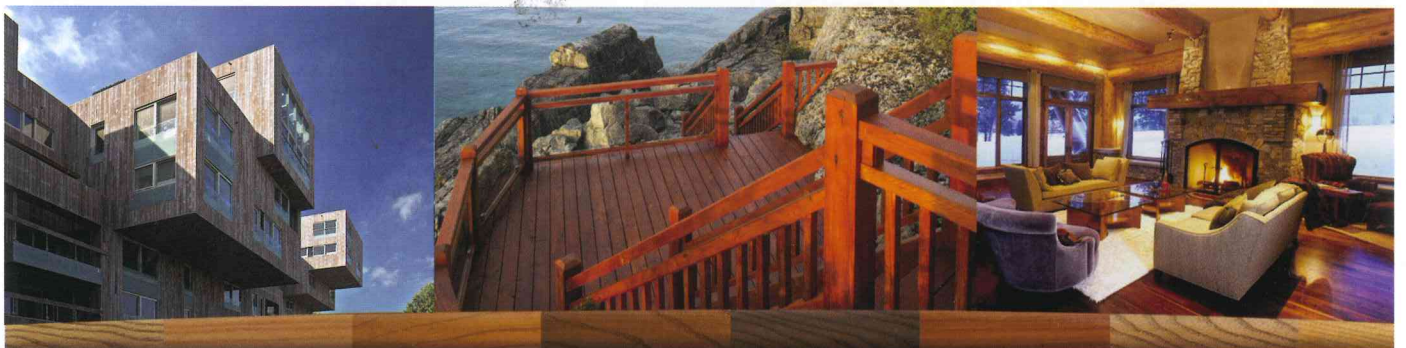
The most successful treatments included a highly UV-resistant waterborne primer followed by a two-step top coat system specially designed for thermally modified wood. Also, normal to extended life cycles were achieved using enhanced low VOC-penetrating for-



Heat treated wood on an office building in the Netherlands.

mulations and have been successfully used since 2002 on large thermally modified siding projects. (See graphic No. 1 and No. 2)

The findings show that with a proper maintenance coat, ongoing and continuous protection of heat-treated wood can be achieved, while achieving a highly esthetic appearance. In this way, you get a new type of wood that has improved dimensional stability and increased resistance to microbial attack and biodegradation – at affordable production costs.



Naturally perfect protection inside and out.

The Sansin Enviro Stain family of products protects log homes, siding, decks, pressure-treated lumber, millwork and furniture, and more. To find out more about naturally perfect wood protection, visit sansin.com

