THERMOWOOD™

DURABLE AND BEAUTIFUL NORDIC TIMBER

finnforest

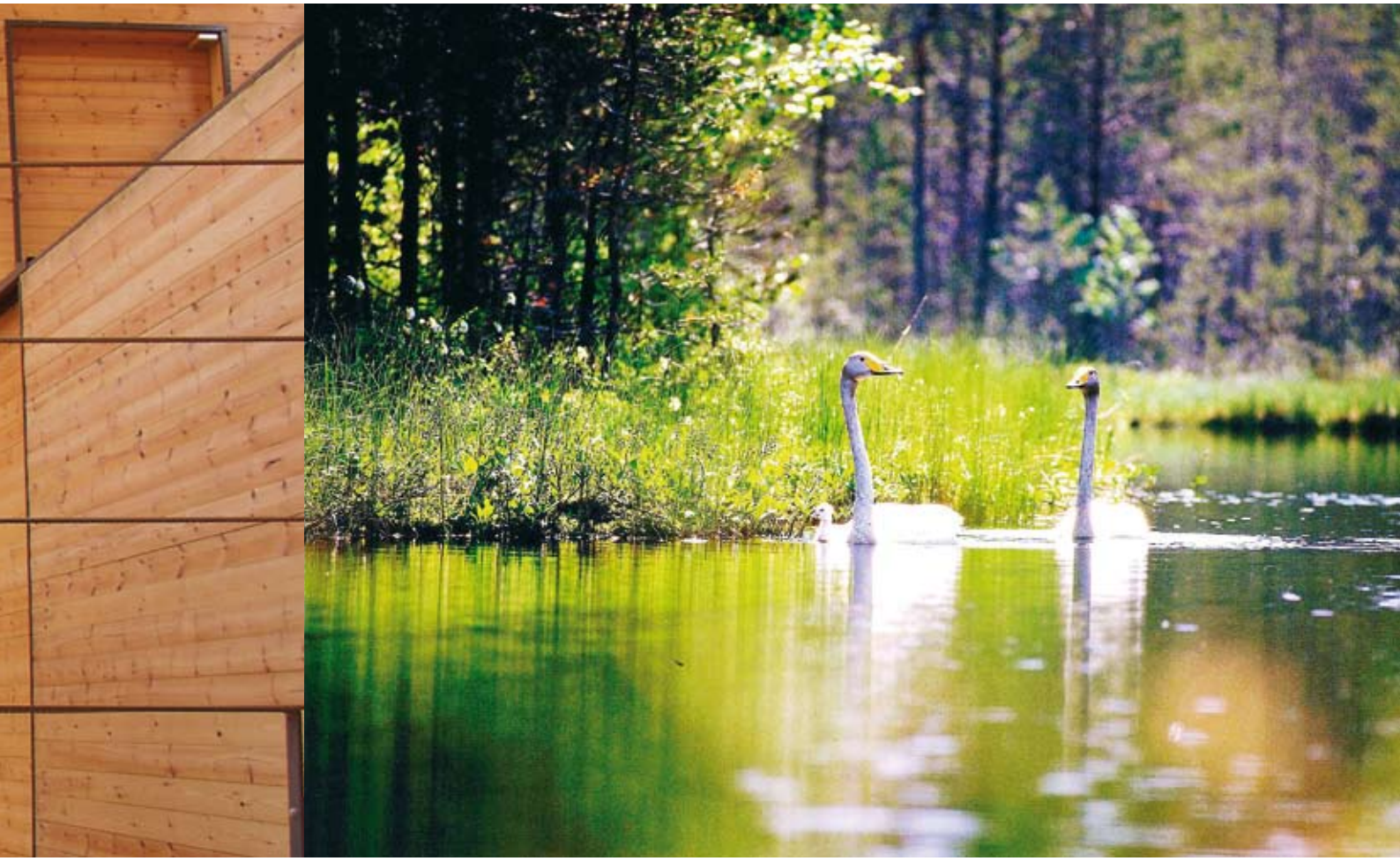
Giraffe House, Copenhagen

Kurunhelmi

Giraffe House, Copenhagen

About Finnforest

Finnforest is a solutions provider offering Finnforest products and services to targeted customer segments, such as building and construction, transport vehicle industry, other industrial customers as well as building material and DIY chains. Finnforest products are based on Nordic premium timber supplied by the forest owners of the Metsäliitto Cooperative. Our sales are 1.4 billion euros, and we employ 4,500 people in 20 countries. We are a part of the Metsäliitto Group, the eighth largest forest industry group in the world.



Environment

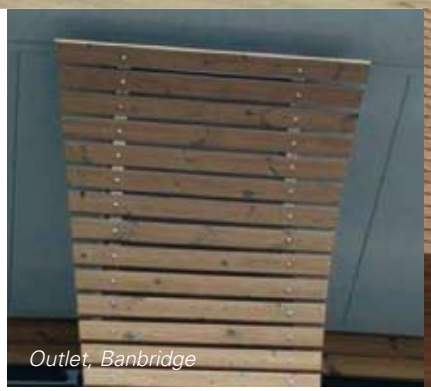
We know the origin of our wood raw material. Metsäliitto does not procure wood from conservation areas where logging is forbidden, or from other prohibited areas. We have a wood origin tracking system, which is included in our certified ISO 9001 and 14001 quality and environmental management systems. Wood origin data is required from all our suppliers. Thanks to our wood origin tracking system, we know the origin of the wood we procure, whether it originates from a certified forest or not. Our wood origin tracking system is also Chain-of-Custody certified.

We support forest certification. Metsäliitto supports forest certification based on independent third party verification. We also aim to increase the use of certified wood in our products and to introduce more labelled products. The forest certification systems in Metsäliitto's wood procurement areas are **PEFC**. In some of our wood procurement countries both systems are used. Majority of the certified wood used by the Group's mills is certified according to PEFC, which is the predominant system for small, privately-owned forests.

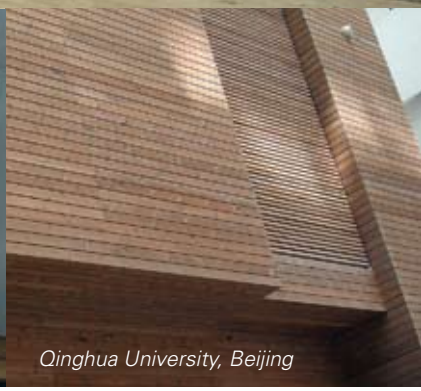
Curbing climate change. Wood is a renewable raw-material and energy sour and wood products are storages of carbon. Wood products are recyclable and can be used as energy at the end of their life-cycle. In fact 65% of the energy requirement of the Metsäliitto Group's mills is produced from wood-based fuels. In Europe forest growth exceeds harvesting, so using wood does not accelerate climate change.

Carbon neutral material. Forests are part of the natural carbon cycle: At first young, growing trees absorb CO2, second the growth of mature trees slows and eventually stops - trees become storages of carbon. Finally dead and decaying trees release CO2. **In the long run the amount of absorbed and released carbon is equal – forests are carbon neutral**.

Kurunhelmi



Outlet, Banbridge



Qinghua University, Beijing

What is ThermoWood®?

Thermowood is a product which is produced using a patented thermal modification process. Thermo treatment has a lasting effect on the technical properties of the material. In short Thermowood means that the durability and stability of light Nordic timber is increased by heating the timber up to an extremely high temperature using only heat and steam. In the process several of the chemical and physical properties of the wood permanently change, mainly caused by thermic degrading of hemicelluloses.

Finnforest ThermoWood® is available in two treatment classes Thermo-S (Scandinavian Pine or Spruce, heat treatment 190ºC, internal use) and Thermo-D (Scandinavian Pine, heat treatment 212ºC, internal and external use).

ThermoWood is a joint trademark for a patented and ecologically sound method of producing heat treated timber that is developed in Finland. An industrial scale heat-treatment process for wood has been developed at VTT in co-operation with the Finnish wood product industry. The ThermoWood® process is licensed to the members of the Finnish ThermoWood® Association.

ThermoWood® process

THE THERMOWOOD® PROCESS CAN BE DIVIDED INTO THREE MAIN PHASES:

Phase 1.Temperature increase and high-temperature drying. Using heat and steam, the kiln temperature is raised rapidly to a level of around 100°C.Thereafter, the temperature is increased steadily to 130°C, during which time the high-temperature drying takes place and the moisture content in the wood decreases to nearly zero.

Phase 2. Heat treatment. Once high-temperature drying has taken place, the temperature is increased to 190°C or 212°C depending of the treatment class. When the target level has been reached, the temperature remains constant for 2–3 hours depending on the end-use application.

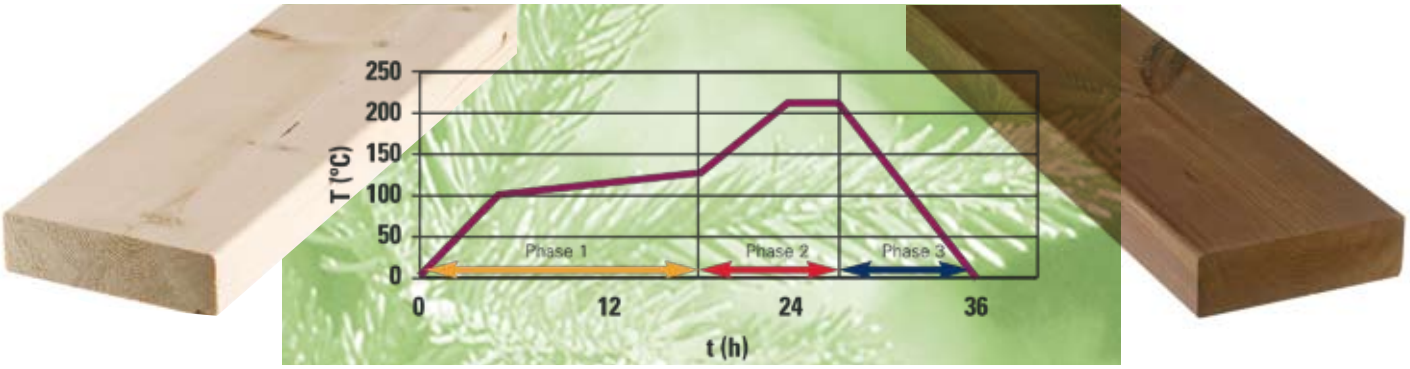
Phase 3. Cooling and moisture conditioning. The final stage is to lower the temperature by using water spray systems; when the temperature has reached 80–90°C, re-moisturising takes place to bring the wood moisture content to a useable level, 8–10%.

As a result of the process, swelling and shrinkage due to moisture is decreased, which makes Thermowood dimensionally very stable while the biological durability is improved. The wood becomes lighter, resin-free and insulation ability is improved. In the process the wood also develops a beautiful, darker colour that is consistent throughout the wood.

Salle Martin

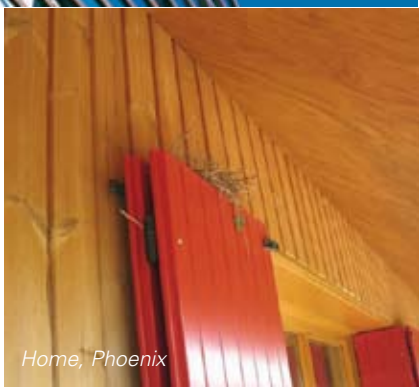
Budapest Ambulance station

THE THERMOWOOD® PROCESS



FMO Tapiola

Benefits of ThermoWood®



Home, Phoenix

DURABILITY The improved durability of Finnforest ThermoWood® makes it an excellent material to use in the production of exterior products.Thermowood has improved resistance against decay.

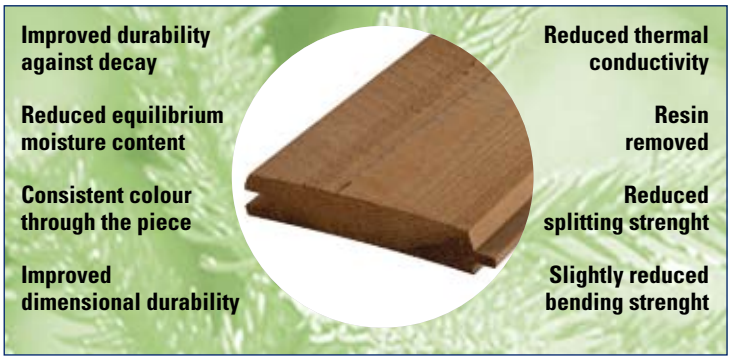
STABILITY Finnforest ThermoWood® is more stable than untreated softwood. The changes that occur within the timber during heat treatment make it less able to absorb or lose moisture. Equilibrium moisture content is reduced abt. 50 % which enables increased stability.

MAINTENANCE Heat treatment removes resin from the timber. As a result there is no resin leakage or "bleed" through the surface coatings.The combined effect of this together with the improved stability can lead to a lower maintenance requirement. Equilibrium moisture content is reduced by around 50% which delivers greater stability.

COLOUR The colour of ThermoWood® is affected by the treatment temperature and time. The higher the temperature the darker the appearance. As with all softwoods variances occur and are due to varying densities. Colour is similar to tropical hardwood species. When ThermoWood® is exposed to UV light, it will lose its colour and turn silver grey unless protected by a pigmented surface protection. Colour is consistent through the entire piece of timber.

ENVIRONMENT The heat treatment process requires no chemical additives.The improved performance is achieved simply by the controlled application of heat and steam. Energy needed for the ThermoWood process is produced by burning bark and wood waste. The production of ThermoWood consumes about the same amount of energy as is used in normal kiln drying of sawn timber. Finnforest ThermoWood® is PEFC-certificated which ensures the raw material is sourced from sustainable managed forests.

Thermowood -properties



SUMMARY OF THE EFFECTS OF THE THERMOWOOD PROCESS ON WOOD PROPERTIES, BY TREATMENT CLASS SOFTWOODS (PINE AND SPRUCE)

	Thermo-S	Thermo- D
Treatment temperature	190 °C	212 °C
Durability	+	++
Dimensional stability	+	++
Bending strength	no change	-
Colour darkness	+	+ +

End-use applications of ThermoWood®

THERMO-S
- interior claddings
- sauna and bathroom furnishing
- furniture
- other interior applications

THERMO-D
- exterior claddings
- decking and garden structures
- other exterior applications


Jiujiantang Villa, Shanghai


Private home


Outlet, Banbridge

Certificates and standardisation

All member companies that produce thermally modified timber participated in the preparation of quality control. Finnforest ThermoWood has also right to use the **KOMO** certificate of the Dutch testing company SKH (Stichting Keuringsbureau Hout) and **PEFC-logo**. The quality control of ThermoWood® production was developed in cooperation with Inspecta Oy.

Preparation of CEN standard of thermally modified timber is now in formal vote stage. At first the standard status will be Technical Specification. Preparation of the standard has been carried out by CEN/TC 175.

Sales and production

Locate your closest ThermoWood sales organisation from: **www.finnforest.com**.

Salle Martin

DeVilliers Hall, Leicester

Jujiantang Villa, Shanghai

Salle Martin

Outlet, Banbridge

Phoenix Houdan

Ideal Home 2006

Qinghua University, Beijing

Qinghua University, Beijing

Jinying Hotel, Chongqing

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Find your closest Finnforest sales organization from:
www.finnforest.com