

A close-up photograph of a wooden surface covered in numerous small, glistening water droplets. The wood grain is visible, and the droplets vary in size, creating a textured, wet appearance. The lighting is warm, highlighting the natural tones of the wood and the clarity of the water.

JARTEK → THERMOWOOD® – TECHNOLOGY FOR
THERMAL MODIFICATION OF WOOD



AURUM,
Architect: ARGO
Photo: Wellu Hämäläinen, ©Lunawood
Product: Lunawood Battens



JARTEK – ThermoWood® Technology

Jartek Invest Oy has been operating in the woodworking industry since 1957. Jartek has expanded its business rapidly during the last decade. The vision of Jartek is to be pioneer in providing state of the art technology for the mechanical woodworking industry. The main target of our R&D is to develop new, value-adding technologies for our customers in order to enhance profitability of their businesses.

Jartek Invest Oy is the leading thermal modification solution provider in the world. We have strong experience in a wide variety of thermal modification equipment. The continuously increasing number of thermal modification projects strengthens

our position as the world's leading thermal modification technology provider.

Our equipment is very competitive and thus provides the best return on your investment. Our products and technical solutions are designed for your individual needs and different production volumes.

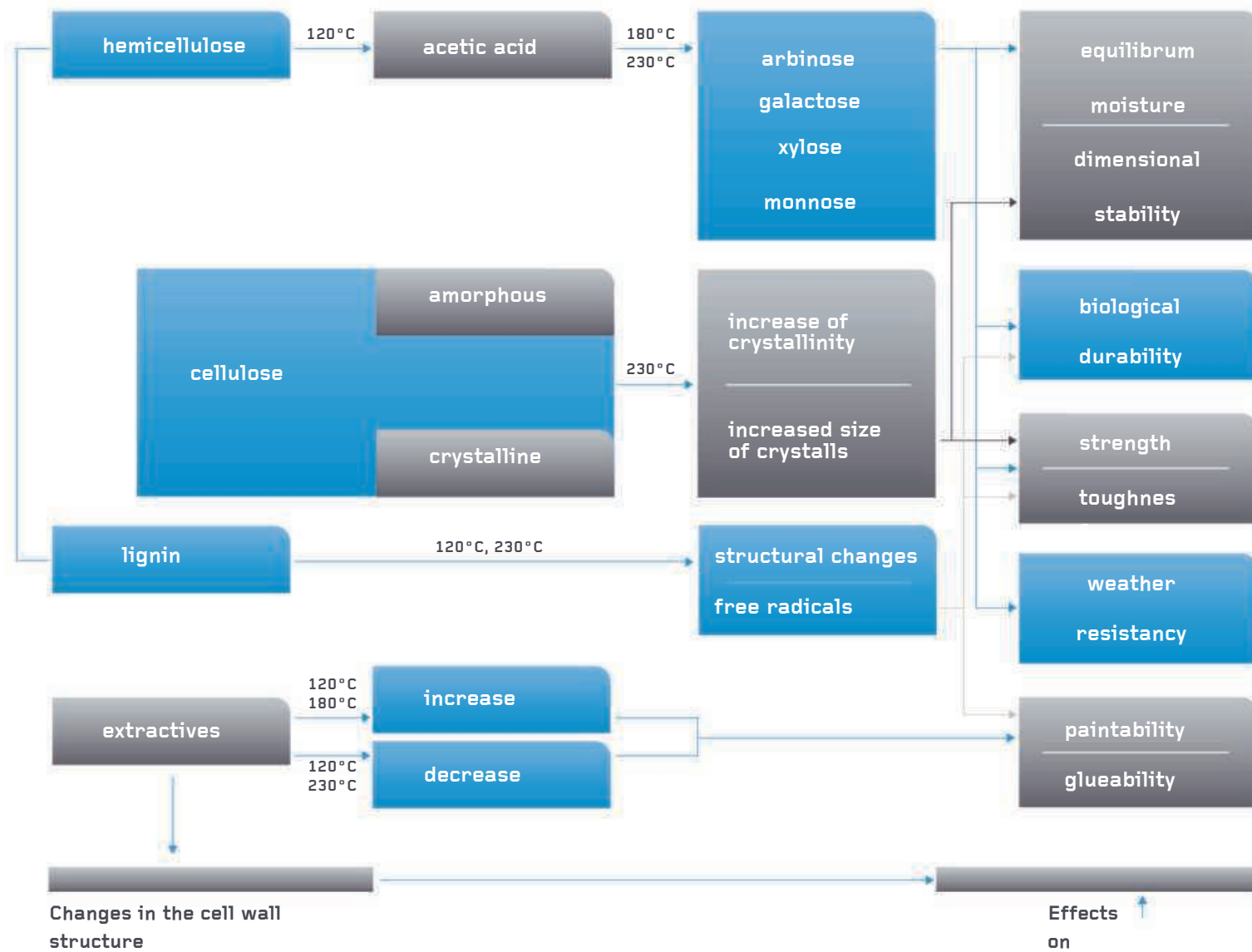
Choosing Jartek's thermal modification equipment will guarantee you comprehensive technological solutions. All our deliveries include full process information about the patented ThermoWood® process, effective implementation, and all the latest knowledge about the thermal modification of wood.

Thermal modification of wood

The wood material is modified in high temperatures (at maximum of 180–230°C for approx. 2–3 hours). The complete thermal modification process in general takes from 24 to 72 hours depending on the initial moisture content of the wood and the timber dimensions. During the high temperature period, the wood is protected against burning by using steam as an inert gas. Due to the high temperatures and steam used, the properties of wood materials change. The most apparent change is the darkening of the wood.

Other changed properties of thermally modified wood are:

Property	Thermal modified wood compared to unmodified
Weather resistance	Significantly better
Equilibrium moisture content	Significantly lower
Biological durability	Improved
Swelling & shrinkage due to moisture	Significantly lower
Density	Reduced
Mechanical properties	Some reduction

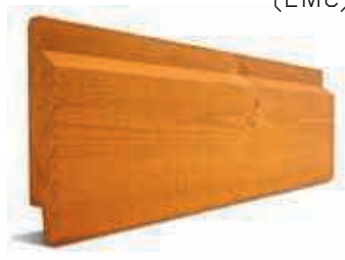


Reaction mechanism of thermally modified wood (source: VTT).



Stability

Most of the resins and extractives of the wood are evaporated during the thermal modification process. The physical structure of the wood is changed due to the dissolution of hemicelluloses. Because of these changes in the structure of the wood, its ability to absorb moisture from the surrounding environment declines. The equilibrium moisture content (EMC) of the wood decreases. The swelling and shrinking of the wood material due to moisture variations can be reduced by up to 60 % as compared to unmodified wood.



Thermally modified wood suits for several end-uses. Products made of thermally modified wood will keep their stability better than products made of unmodified wood in constantly changing relative humidity (RH) environments. Furthermore, the durability of painted surfaces is greatly improved in the process because the amount of extractives and resins decreases. With Jartek's thermal modification equipment, you are able to keep your product quality uniform and add value thanks to improved stability and paint suitability.

Biological durability

Thermally modified wood is more durable than normal wood against biological damages, such as decay caused by brown rot and fungi. The improvement of biological durability depends on the decreased amount of hemicelluloses, since many fungi use hemicelluloses as their prime nutrient. Like unmodified wood, uncoated thermally modified wood will turn a grey weathered colour over a period of time when exposed to direct sunlight. Therefore, to attain the best biological durability, thermally modified wood should be surface coated.

Thermally modified wood is extremely well suitable for terraces and garden furniture manufacturing, bathroom interiors and saunas, thanks to its increased biological durability and the decreased EMC (better stability). Improved durability can be reached with many wood species, so you can replace the usage of tropical wood species and move to more environmentally friendly manufacturing.



Project Ö
Architect: Aleksi Hautamäki
Photo: ©Lunawood
Products: Luna Panel system and Luna SHP PF3





Change of colour

The colour of wood will darken in the thermal modification process. The wood is darkened throughout, and the higher the temperature that is used in the modification process, the darker the colour will be. The colour change can be accurately controlled, thanks to special software.

The colour change of the thermally modified wood is especially useful in the flooring industry since it can be used to emulate tropical wood species. You can add to the value of your production by using, for example, planted wood species and therefore do not have to be dependent on the availability of high

cost tropical wood species anymore. You will therefore be able to manufacture high quality products that look like real tropical wood from inexpensive raw materials. With Jartek's technology, you can support sustainable development.



Environment

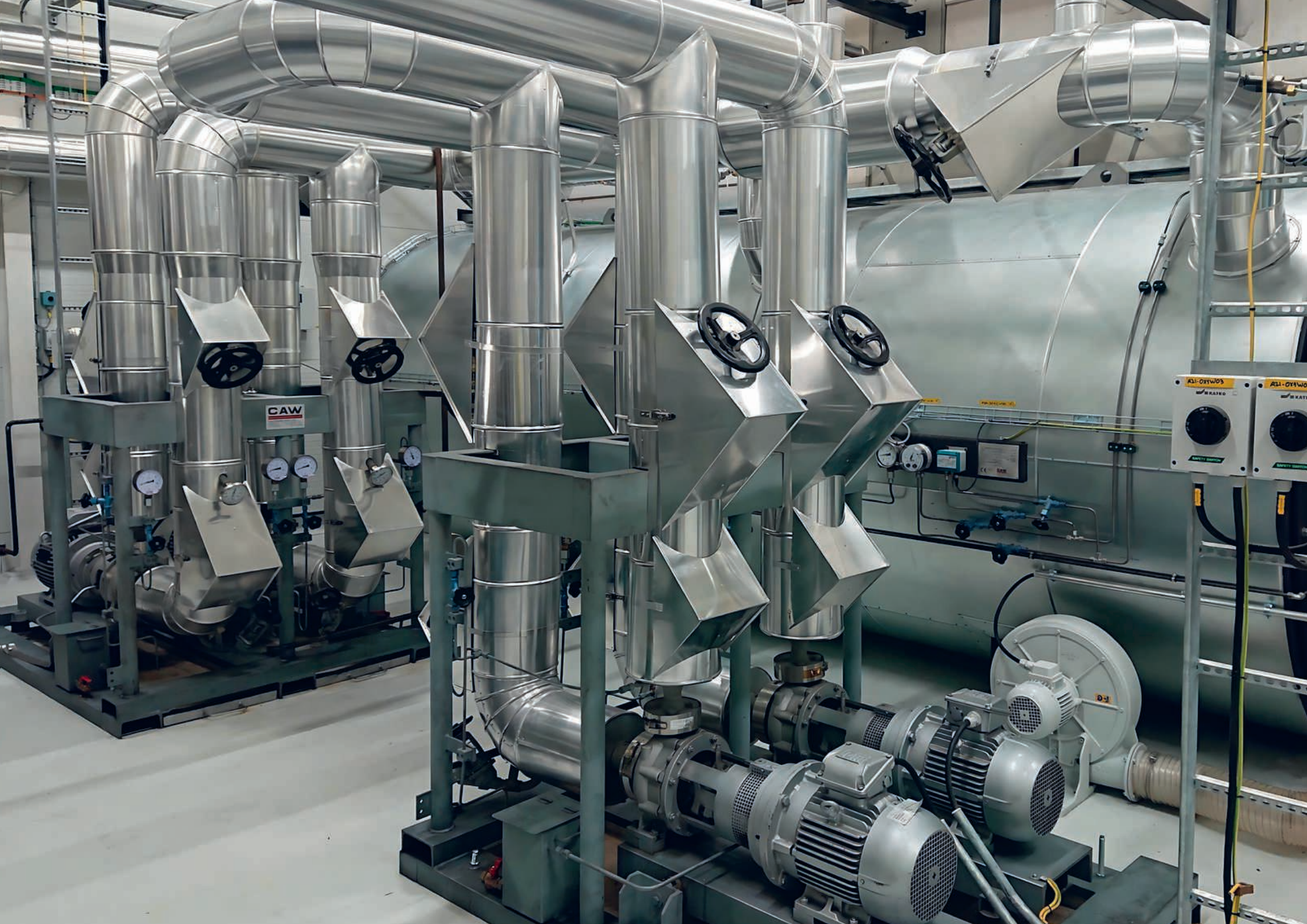
Thermal modification is an environmentally friendly process. The wood material is modified using only heat and steam. No toxic or other chemicals are used in the modification process. The extractives evaporated during the modification process can be turned into additional heat energy by burning them.

The needed heat energy can be produced in an environmentally friendly way by burning biomass or by green electricity. The total consumption of energy is only 20–30 % higher than in the standard wood drying process.

Thermally modified wood is recyclable in the same way as natural unmodified wood. The use of thermally modified wood products does not accelerate the greenhouse effect. The disposal of modified wood will free no more carbon dioxide than the wood has bound the air during its growth phase. Environmental balance is therefore ensured during the entire life cycle of thermally modified wood products.









Energy

The thermal modification equipment can be provided with a boiler system that enables you to utilize the by-products of your production, e.g.:

- Bark
- Sanding dust
- Wood chips (green or dry)
- Sawdust

Alternative energy sources for heat generation can also be electricity, biogases and fossil fuels. The energy costs will also be reduced due to shorter drying times and efficient, aerodynamically designed fans and air flow conditions.

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The size of your heating plant can be designed to solve your other heating demands, too. We are continually cooperating with specialized boiler plant suppliers so that we can provide you with the best and most effective energy efficient solutions.



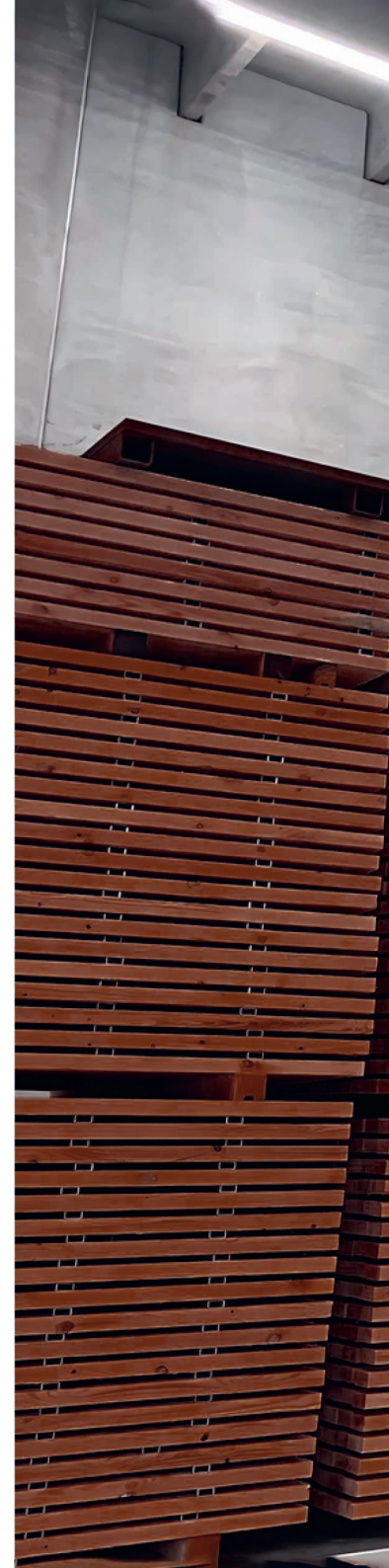
Technical data

Thermal modification takes place at high temperatures and the evaporated resin and extractives create a corrosive environment inside the modification chamber. That is why all Jartek's thermal modification equipment is made solely of stainless steel (AISI 304). Every last detail is taken into account when designing our technical solutions for you.

Capacity is not an issue; we provide a large variety of options. With our thermal modification equipment, you can produce high quality products efficiently and profitably from 1000 m³ per year. We can provide traditional as well as automated production lines, tailored specially for your needs and demands.

The chart below shows an example of the technical data of 20 m³ and 60 m³ thermal modification chambers.

Size of load 20 m ³		Size of load 60 m ³	
Width	2400 mm	Width	2400 mm
Height	2400 mm	Height	4000 mm
Length	6000 mm	Length	9000 mm
Slabs	25 mm	Slabs	25 mm
Energy and power		Energy and power	
Heat	500 kW	Heat	1500 kW
Steam	100–300 kg/h	Steam	600–900 kg/h
Electricity	40 kW	Electricity	120 kW
Total capacity	1600–3300 m ³ /y (Depends on wood species and dimensions)	Total capacity	5000–10000 m ³ /y
General information about the consumption of energy			
Pre-drying	200–400 kWh/m ³		
Thermal modification	100–200 kWh/m ³		









Jartek partnership

We take your company's concerns, demands, and needs into account and turn them into realistic business solutions. You will always get competitive payback period on your investment with Jartek's thermal modification equipment. Your partnership with us means a long lasting, reliable and profitable business relationship.

All the equipment has a one-year guarantee. Our equipment can be delivered according to "turn-key" principles, and every project can include the following features without any extra charge:

- Individual and careful planning of the entire project
- All needed assembly work
- Effective implementation and commissioning

- Comprehensive instructions for the operation and maintenance
- Expertise transfer and instruction in the entire ThermoWood® process
- On-line technical support and functional after sales service

In addition to our "turn-key" delivery we can also carry out tests with your own wood material and create new recipes. If you have any kinds of questions, comments, or interest concerning thermal modification equipment, please feel free to contact us at any time.



JARTEK SVINHUFVUDINKATU 19, P.O.BOX 14, FI-15101 LAHTI, FINLAND, TEL. +358 3 787 5400, SALES@JARTEK.FI, WWW.JARTEK.FI