

Batch kilns





The first step towards the perfect solution.

The wood processing industry is experiencing an interesting development. Recently, we have seen many initiatives to increase processing that broadens the market for wood, both here at home and internationally. We have committed to maintain our leading position in our part of the industry. Our contribution is to develop increasingly better technologies for everything from timber-drying to heat treatment that address increasingly stringent requirements from our customers' customers. We also want to be able to offer the perfect solution for every production and quality requirement. This is why we offer the market's broadest product programme for our field.

This brochure presents our range of batch kilns, high-temperature kilns and heat-treatment plants. Batch kilns have always been the natural choice for drying thick planks and when there are strict requirements for drying quality. Even though batch kilns are seeing tougher competition from the new generation of batch kilns, there are areas in which the production process and end-quality requirements make batch kilns the ideal choice. The drying principle is basically the same, the difference being that in batch kilns the air quality is changed for each package as it progresses through the kiln, whereas in batch kilns the air quality is regulated for the entire batch during the drying period. This same applies to high-temperature kilns for customers who prioritise high productivity.

Our heat treatment plants are based on the market-leading ThermoWood® method. In addition to its unique durability and shape stability, heat-treated wood is also popular because of its natural brown tone.

Use this brochure and our batch kiln material as guides for addressing your kiln needs. Then ask us to suggest the perfect solution for your requirements and those of your customers.

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Forklift-fed batch kilns





Like all our batch kilns, forklift-fed batch kilns permit precise control of air quality throughout the drying process. This allows extensive drying to the precise target moisture content with minimum risk of checking. This kind of drying is also very flexible and can accommodate many types of wood and dimensions. Forklift-fed batch kilns need relatively little space and are a good choice when strict specifications require optimum end quality at minimum investment cost.

In combination with the market's leading control systems, our batch kilns provide all the prerequisites for meeting increasingly strict processing and customisation requirements. On the basis of the drying requirement, there is a choice between schedule control, model control, power control, adaptive simulator control and adaptive temperature-drop control. Add to this Valutec's leading simulator

technology, which in the hands of a professional kiln operator radically shortens the time for optimum drying processes.

The kiln building is made of stainless steel, and the circulation air is controlled by axial fans. Thanks to the building's width of up to 14 metres, you can place two or more packages alongside each other. The building has a ventilated loft, where all sensitive equipment is placed. All design solutions are based on Nordic and internationally leading research and development (see technical solutions on page 12). The kiln can also be complemented with a heat recovery system.

Valutec's forklift-fed batch kilns are specially adapted for planks but can also be used for boards. Batch volume varies from 50 m³ to 450 m³, and the target moisture content is 5-20%.



PRINCIPLE

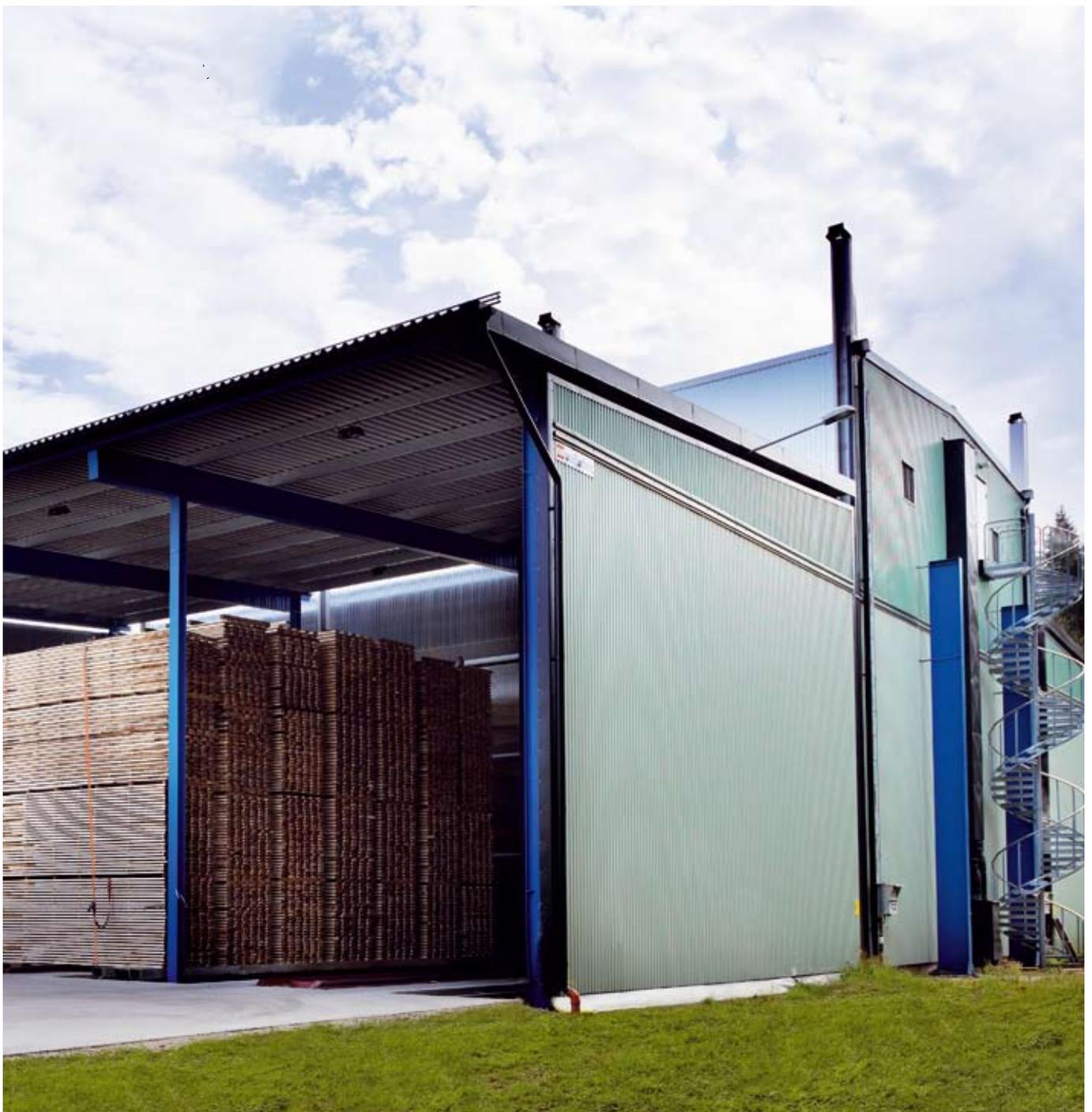
The kilns are loaded and unloaded by forklift from one side. Axial fans placed on a deck above the timber blow the circulation air longitudinally between the lines of timber stacks. The lamellar heating coils create maximum heat transfer. Following the initial equalisation of the moisture content, the heat level is adapted as moisture content changes. The moist air is evacuated through two ducts on each side of the load, using the pressure difference or an exhaust-air fan.



"OUR EFFORTS TO DEVELOP INTO ONE OF EUROPE'S BEST SPRUCE SAWMILLS HAVE INCLUDED INTRODUCTION OF NEW FORKLIFT-FED BATCH KILNS. THEY MEET OUR REQUIREMENTS FOR EXTENSIVE DRYING, PRICE PERFORMANCE AND OPERATIONAL ECONOMY. IN MAKING OUR CHOICE WE PLACED GREAT EMPHASIS ON TECHNICAL SOLUTIONS AND ON THE DRYING BUILDING'S DESIGN AND CONTROL SYSTEM."

Jerry Larsson, sawmill manager at SCA Tunadal

E-cart-fed batch kilns





E-cart feeding is a good option if priority is on large batch volumes and high productivity. Since the loading and unloading is done in the kiln's lengthwise direction, a large number of kilns can be placed beside each other. Switch times are minimised by loading timber outside the kiln. Batch kilns offer exceptional flexibility in terms of types of wood and sizes. The exact control of the climate during the drying process provides optimal conditions for meeting demands for a high degree of processing and customisation. This type of kiln is able to dry to the exact target moisture content and minimise the risk of checking.

The kiln building is normally built of stainless steel and the circulation is controlled by axial fans. The building has a ventilated loft where all sensitive equipment is located. All construction solutions are based on leading Nordic and international research and development. (See technical solutions on page 12). The kiln can be complemented with a heat recovery system.

Valutec's e-cart-fed batch kilns are specially designed for planks but can also be used for boards. Batch volumes vary between 50–450 m³ and the target moisture content is 5–20%.



PRINCIPLE

The e-cart is fed with a feeder. The kiln can also be supplied with equipment for automatic batch feeds. Axial fans placed on a platform above the timber load circulate air lengthwise between openings in the timber batch. The heat coils offer maximum heat transfer. After the initial moisture content has been reached, the heat is adjusted based on how the moisture content changes. The moist air is ventilated out through two ducts on each side of the load using the pressure differentiation or an exhaust fan.



"INVESTING IN NEW KILNS WAS PART OF OUR EFFORTS TO STREAMLINE AND MAKE OUR OPERATIONS MORE COST-EFFECTIVE. WITH THREE MODERN BATCH KILNS, WE WERE ABLE TO REPLACE SIX EXISTING CONDENSATION KILNS. E-CART FEEDING SAVES LOTS OF TIME AND MONEY SINCE WE DON'T HAVE TO DRIVE IN FORKLIFTS AND SEPARATE THE TIMBER MAGAZINES."

Olof Hållander, Hållanders Sawmill

High-temperature kilns



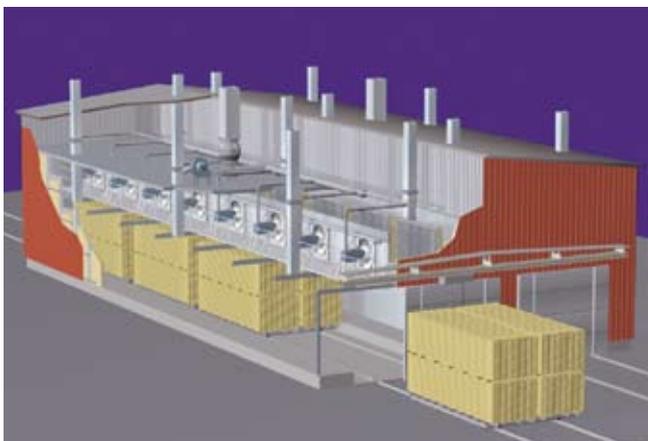


When requirements for moisture content distribution and the timber's end-quality allow, there is the possibility of choosing an alternative drying method with very high productivity. The drying process in the high-temperature kilns is significantly faster than in other timber kilns. For example, the drying time for 50-mm timber is about a day. With drying temperatures up to 140 degrees C, the water is vaporized, allowing for quicker drying than through normal diffusion. In order to be able to withstand the high temperatures, pressure from the steam and the vaporization, the kiln is stainless steel, steamtight and well-insulated. The construction has a ventilated loft where all sensitive equipment is located. The fan motors are air-cooled and well sealed. The kiln also has charging solutions for effective batch switches, where the timber is loaded on carts, which are fed in using a rail system. Drying is primarily controlled through adjustments to the

added heat effect and the choice of dry temperature, which allows the control of the evaporation to achieve the desired results. In the drying's final phase, the process can also be controlled through psychrometric differences.

Timber dried in a high temperature kiln has a relatively high moisture gradient, the surfaces are dry and the centre is relatively moist, with compression stresses in the surface and tensile stresses in the centre. These differences are smoothed out during conditioning and after drying. The short drying times mean the depth of the blowing section in a high temperature kiln should not exceed 4 metres, which means that two timber packages of normal size can fit side-by-side.

Valutec's high temperature kiln is specially designed for planks and poles but can also be used for boards. Batch volumes can be up to 200 m³ and have target moisture contents of 2–18%.



PRINCIPLE

The timber is dried through vaporization of the water through boiling in a setting with temperatures of 100°C and above. The timber is loaded on to carts that are then pushed or pulled on rails into the kiln. Fans blow the air through the timber perpendicular to the direction of transport. Saturated water vapour is used to quickly steam heat the timber. The moisture gradient with dry surfaces and relatively humid centres is evened out through conditioning.



”THE MAJOR SAVINGS WITH HIGH TEMPERATURE DRYING OF OUR POWERLINE AND PHONE POLES IS THAT WE AVOID THE NEED FOR LARGE STOCKS. VALUTEC HELPED US CHOOSE THE RIGHT SOLUTIONS FOR OUR NEEDS. FROM THE START WE HAD CLOSE AND OPEN DISCUSSIONS WHERE OUR EXPERIENCE ALSO CONTRIBUTED TO THEIR DEVELOPMENT WORK.”

Tommy Karlsson, managing director of Impregna AB in Ludvika

Heat treatment

ThermoWood®





Valutec's facilities for heat treatment are based on the market leading ThermoWood method. ThermoWood® is nearly a new type of wood since the treatment gives the wood entirely new characteristics. This is also the reason for the increased interest on the market, for example, in using it as an alternative to tropical woods and preservative-treated timber. The wood gains more dimensional stability when changes in moisture occur, absorbs less moisture than regular wood, is more resistant to rot, and gains attractive brown tones throughout the wood. The treated wood maintains its unique characteristics even during shifting weather conditions. By adjusting the temperature level and process time, the timber's characteristics and brown tone can be adjusted to the end-customer's needs. The wood gains a low equilib-

rium moisture ratio and increased resistance to biological decomposition. Since no chemical products are used in the process, ThermoWood® is a much more environmentally friendly alternative and poses no risk of chemicals leaching from the final end product. It can be used for outdoor panelling, doors, windows, patios, sauna panelling, decks and furniture.

The basic technique is the result of a Finnish collaborative project in the 1990s. Since then Valutec has continued research and development together with partners in the Nordic countries and Canada.

Valutec's facilities for heat treatment are specially designed for boards but can also be used for planks. Batch volumes vary between 10–150 m³ and the target moisture content is 2–6%.



PRINCIPLE

The process begins by drying, either in a conventional kiln with following treatment in a separate heating chamber, or as a first step in an integrated process. The heat treatment step involves the heating of the timber to between 180 and 230 degrees, which is done in a low-oxygen steam atmosphere to avoid pyrolysis and fire.



"WITH ITS UNIQUE ENVIRONMENTAL ADVANTAGES, FORM STABILITY AND APPEALING COLOUR, WE SAW MAJOR MARKET POTENTIAL IN HEAT TREATED WOOD. WE CHOSE THE PATENTED THERMOWOOD® PROCESS AND A PLANT FROM VALUTEC WHICH OFFERED THE BEST PRICE PERFORMANCE. AFTER A WELL-IMPLEMENTED INVESTMENT PROJECT, WE HAVE A PLANT THAT MEETS ALL OUR EXPECTATIONS."

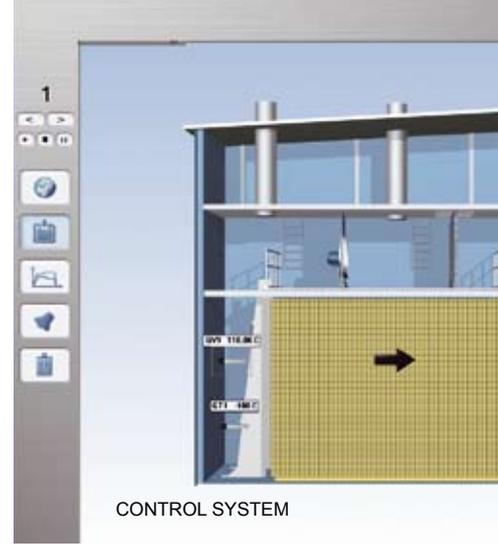
Gustav Åström, managing director of HeatWood in Hudiksvall



STEAMING



PRESSURISED FRAMES



CONTROL SYSTEM



E-CART-FED



HEAT COILS



HEAT RECOVERY

Cutting edge solutions. In every detail.

Control system. Valmatics and PCS 190. To facilitate compatibility with customers' previous control systems, Valutec offers two of the market's leading control systems: Valmatics and PCS 190. The systems provide great freedom of choice in selecting the control method. Graphical, intuitively designed interfaces make the systems very easy to use. Simulators for automatic calculation of the optimum drying plan, temperature settings and tension intervals based on raw-material data facilitate changes in wood sizes.

Construction system All kilns are obtainable with Valutec's construction system in stainless steel or aluminium.

Stainless steel FEM-calculated design in 2-10 mm.

Prefabricated modules with a minimum of welding. Static joints with screwed joint reinforcements and silicon mass. The framework is designed to withstand the spread of heat and fatigue. No need for assembly welding. Very resistant to instability and breakage.

Aluminium FEM-calculated material-optimised basic design.

Metre-wide profiled parts, manufactured in a cutter. The parts are bent in a 14 m-long tandem press. Static joints with screwed joint reinforcements and silicon mass. Prefabricated block segments bolted together for streamlined block assembly. Stable sections in 2 mm and load-bearing profiles in 6-10 mm. Dimensioning for loads and heat expansion.



DOORS



CONSTRUCTION SYSTEMS



FLAPS



FANS

Doors Rigid door blades made of aluminium. The blades are made of the same elements and joint systems as the construction system. Mineral-wool insulation and profiled cover plates with good insulation against heat and sound. The elements are held together by an external frame with a seal strip. Coated pins provide effective locking against the door frames' sealing surface. Door lift with vertical electrical wire windlass.

Fans Axial fans optimised to ensure maximum operating efficiency. Diameters from 800 mm to 1600 mm with adjustable or fixed blades. Motors with air-cooling are supplied for operating temperatures over 90 degrees. An external cooling fan brings cooling air to each motor.

Flaps Flaps for sealing around the wood load to counteract energy leakage and unnecessary spread of moisture. Collapsible side flaps with mechanism for manual operation for varying wood widths.

Wood feed Package feed system with stable wood wagons and well-balanced rail system. Fully automatic feeding system with packaging function in the input and output feed buffer.

Pressurised frames Pressurised frames for minimum deformation of the upper layers of wood. Stably guided stainless load frames that permits permanently mounted cylinders and completely tiltable frames without any risk of locking. Loads of up to 1 tonne per cylinder. Stainless rod pistons with viton seals and stainless tubes, including connectors. Also available in scissor model for insertion into existing kilns.

Steaming Steaming system for minimised check formation, controlled spread of moisture and reasonable moisture gradients.

High-pressure hot-water steaming. Pre-heated water is compressed and finely distributed through separate nozzles at high pressure. The higher water temperature facilitates vaporisation of the water droplets, creating efficient moistening of the circulatory air.

Steaming (Relaxing process). The system uses steam as a medium for creating controlled climate during heating and conditioning. The steam provides very fast heating through condensation on the wood surfaces.

Heat coils Lamella-type heat coils made of copper pipes and aluminium or copper lamellas. Large transfer area and heat-conducting material create efficient heat transfer. Low air resistance and little risk of clogging. Well-controlled pipe connections, flanging and hard-soldering.

Heat recovery Contraflow air/air or alternately, air/liquid heat exchangers that utilise energy in the exhaust air to heat up supply air. Compact and largely maintenance-free construction in stainless material. An evacuation fan is positioned adjacent to the exchanger. Available in three sizes. The energy recovery for batch kilns in normal temperature ranges is 10-20%.

Batch kilns.

Informational guide.

○ = sufficient
● = recommendation

| PROPERTIES | BATCH KILNS | | HIGH TEMPERATURE KILN | HEATING TREATMENT |
|--|--------------|------------|-----------------------|-------------------|
| | Forklift-fed | E-cart-fed | Cart-fed | ThermoWood® |
| Boards | ● | ● | ● | ● |
| Planks | ● | ● | ● | ○ |
| Minimal area requirements | ● | | | |
| Large batch volumes | ● | ● | ○ | |
| High availability/short changing times | | ● | ● | ● |
| Minimal checking | ● | ● | ○ | ○ |
| Minimal moisture ratio distribution | ● | ● | ○ | ● |

| TECHNICAL INFORMATION | | | | |
|---|----------------------------------|--|------------------|------------------------------------|
| Max drying temperature (°C) | 90 or 120 | | 140 | 230 |
| Batch volume (m³) | 50-450 | | <200 | 10-150 |
| Target moisture content (%) | 5-20 | | | 2-6 |
| Building materials | Stainless steel or aluminium | | Stainless steel | Stainless steel |
| Coef. on therm. transmittance (W/m² °C) | <0,30 | | | <0,30 |
| Door system | Horizontal or vertical doors | | | Horizontal |
| Flaps | Vira cloth or EPDM | | | Stainless plating |
| Top load | Pneumatic pressure frames | | Separate weights | Separate weights |
| Fans, diameter (mm) | 1 250–1 600 | | | 1 250-1 600 |
| Fans, number | 2-4 | | 2-15 | 2-10 |
| Air speed (m/s) | 4-6 | | | 3-6 |
| Steaming system | High pressure hot water or steam | | | High pressure cold water and steam |
| Control system | Valmatics or PCS 190 | | | Walpas TPR |
| Heat media | Hot water or steam | | | Steam, electricity or hot oil |

See separate product sheet. Valultec reserves the right to make changes.



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