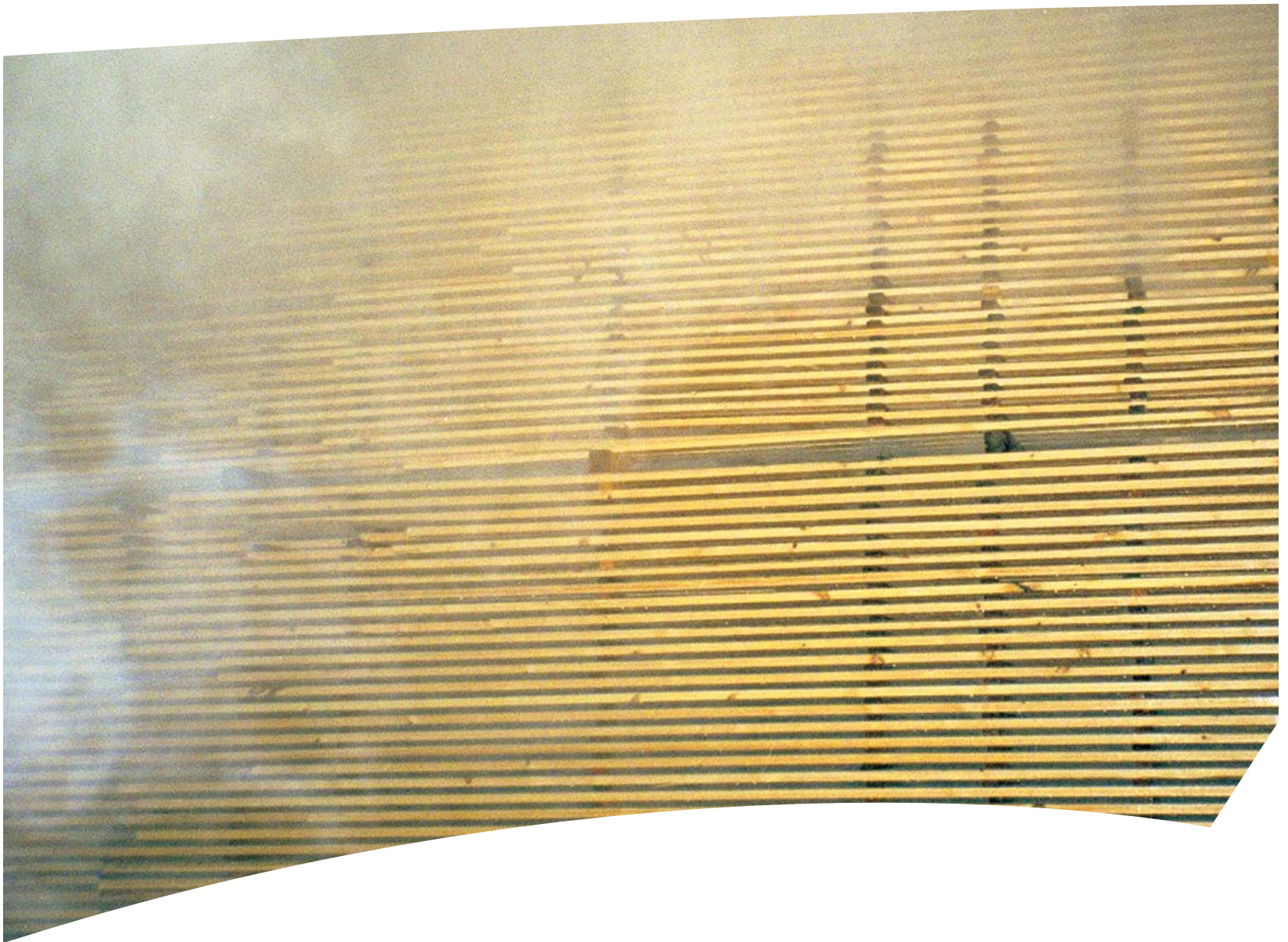


Danfoss



Cold steam for dry kilns
High-pressure water mist to control relative humidity

DANFOSS HIGH-PRESSURE PUMPS

Advantages of High-Pressure Water Mist compared to Steam Spray

- **Savings in the operation cost of creating steam**
If you are using a steam boiler, the cost of fuel has increased dramatically in recent years and as a result, the cost of creating steam has gone up too.
- **Avoid investing in a new boiler**
Running out of boiler capacity? Then a combined system with steam for heat generation in the heating coils and high-pressure water mist for the humidity control will save you from investing in a bigger boiler.
- **Eliminate super heat**
An uncontrolled temperature rise in the kiln due to too much steam is not desired. It will prolong the drying cycle as the vents will have to be opened. At worst it can cause damage in form of discoloration, resin overflow and knot ejection.
- **Reduction in boiler maintenance and chemical cost**
New steam must be created regularly if steam is used for both heat generation and humidity control. This will result in increased corrosion of the boiler, pipes and heating coils and it is necessary to add chemicals to prevent this.

Danfoss High-Pressure Water Mist System is the Green Way to control Humidity in your Dry Kilns

1. Reduction in Water and Chemical Cost:

With the Installation of a Danfoss High-Pressure Water Mist System in your dry kilns, the amount of water running through the boiler during the equalizing and conditioning cycle will be reduced significantly. Along with the reduced amount of water, the costs of chemicals to treat the water will go down too.

2. Reduction in Boiler Fuel Costs & Reduced Demand on Boiler:

When installing a Danfoss High-Pressure Water Mist System in your kilns, a closed loop system is generated, as live steam from the boiler only will be used to heat the kilns and not to equalize and condition lumber anymore. The water for equalizing and conditioning a load of lumber will be supplied from a low-pressure water source separate from the boiler directly to the Danfoss High-Pressure Power/Pump Unit. The Danfoss pump unit will pressurize the water to 1400 - 1500 PSI and spray it out through small nozzles mounted in the kilns. This setup will increase the effective boiler capacity and reduce the energy consumption significantly. Whether using gas or bio-mass products to fuel your boiler, the fuel required for equalizing and conditioning will be substantially reduced. With the increasing fuel prices, the reduction in fuel usage will result in increased cash flow for your operation.

3. Reduction in Electricity Costs Due to reduced Conditioning Time:

The Danfoss High-Pressure Water Mist System will reduce the conditioning period considerably. As live steam no longer is required in the kiln, the super heat effect will be eliminated and the set points more consistently maintained! The humidity control obtained with the Danfoss system will allow the wood to absorb moisture in reduced time. The reduced conditioning time will require less fan activity and therefore reduce your electrical consumption on every load of lumber produced though out the entire year.

4. Improved Lumber Quality:

The uniform humidity control obtained with the Danfoss High-Pressure Water Mist system for equalizing & conditioning lumber will result in noticeable lumber quality improvements. The wood will be brighter, and reduction in standard deviation and improved stress relief in the lumber is obtained. Improved lumber quality and better yields will provide a quick pay back for your operation when installing the Danfoss High-Pressure Water Mist System for Dry Kilns.



Nozzle



Dry kiln



Pump unit with output valves



Electrical control box with built-in PLC

Humidity Control with High-Pressure Water Mist

- The water content in the dry air is increased by supplying a fine water mist into the air flow.
- The very fine water mist is created by spraying out water at 1500 psi pressure through small nozzles.
- The high-pressure water mist is absorbed almost instantly into the dry air before it hits the kiln wall or lumber stack.
- The moisture in the wood will be affected in the same way regardless of whether the air is humidified using steam from your boiler or steam generated from atomized water inside the kiln.
- Using hot steam to control humidity will increase the ambient temperature in the kiln. By using cold steam, however, you add humidity without increasing the temperature. This will allow you to shorten the conditioning cycle and improve efficiency of your kilns because the wood will not be heated continuously whenever you need to add humidity.



How is a High-Pressure Water Mist System Installed?

- The Danfoss high-pressure power/pump unit is located outside the dry kilns, and high-grade stainless steel tubing is run to each kiln. Nozzles are spaced 1 foot apart and are mounted between the fans and the heating coils at the proper height and angle.
- The nozzles are programmed to open at any given time depending on the humidity levels and the fan direction inside each kiln. Also programmed into the system are time delays to prevent water mist to spray out during fan reversal or when the wind velocity is below the needed air speed.
- The Danfoss PLC mounted in the control box on the power/pump unit will be tied in with the electric control of the fan direction and fan reversal. The existing signal from the dry kiln controller demanding humidity in a certain dry kiln activates the high-pressure water mist instead of spraying out live steam.
- The Danfoss installation crews are highly trained individuals that understand how to install the Danfoss high-pressure water mist system in dry kilns. They also understand the concept behind the reason for using the high-pressure water mist in dry kilns instead of live steam to equalize and condition lumber. This is key to having a successful installation.



One Pump Unit for Several Kilns

- Several kilns can run off the same pump as a built-in frequency drive will ramp up and down to maintain a constant 1500 psi pressure no matter how many kilns have water mist turned on
- There are two output valves per kiln (one for each fan direction) and the output valves will come with an automatic drain function of the pipes/nozzles when the system is not running
- To make sure all water is drained out of the system, compressed air is automatically blown through the lines to prevent frost damage

Minimum Maintenance

- Danfoss' water-lubricated pump is the core of the pump unit. This pump is completely free from lubrication oil, and as a result there is no oil to change
- Danfoss' output valves are designed to handle a very high number of activations
- Danfoss' stainless steel nozzles with built-in check valves prevent debris from entering the nozzles from the outside
- All parts are made of stainless steel to ensure a long life in the harsh and acidic environment



Complete service from Danfoss

- Danfoss and its partners are well experienced in supporting the wood processing industry with high-pressure water solutions for various applications. Danfoss continues to help its customers obtain lower production cost and a healthier work environment
- The key is to supply the optimum amount of water at the right time in the right spots. Our system has been carefully developed and built on the basis of the specific needs in the wood processing industry
- In addition, Danfoss ensures optimal installation, commissioning and servicing of your high-pressure water system

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