ENGINEERING TOMORROW

Case story | Sawmill MD

Sawmill MD **engineers** **profitable** humidity treatment with **flexible** Danfoss PAH pumps

Ponderosa pine, a species native to the mountainous regions of western North America, is a versatile softwood valued for its many applications. Common grades are widely used in construction, while the more expensive select grades are cherished by architects, designers, and furniture makers for their distinctive look and easy workability. Precise humidity control is critical to the process of transforming ponderosa pine from massive logs to sawn planks and boards, and the quality of this process is directly related to how much of the finished wood can be sold as premium grades.

Sawmill MD recently designed and installed innovative drying, equalizing, and conditioning equipment for an Arizona sawmill that treats exceptionally large quantities of ponderosa pine with high-pressure humidity deployed with unprecedented precision. A flexible Danfoss PAH pump and frequency drive are critical components of the advanced engineering that goes directly to the lumber producer's bottom line.

Highlights

Powerful and flexible solution
Savings on CAPEX and OPEX
Precise humidity control

The challenge:

Design **extremely accurate** high-pressure humidification for a very large dry kiln to optimize lumber **quality** and **profitability**

According to Mike Ballard of Sawmill MD, this project's biggest challenge was related to its scale. "Our customer's main kiln is over 100,000 cubic feet (nearly 3,000 m³) and can hold up to 175MBF (413 m³) of lumber," he says. "That's a big space to control, especially for a species like ponderosa pine, which is very vulnerable to staining and quality downgrades if it is not dried correctly."

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In addition to the main kiln, the customer also required humidification for a smaller kiln that holds about 115MBF (271 m^3) of lumber. The sawmill's location in arid high desert of central Arizona further complicated the task, as humidity within the kiln had to be modified by up to 70% compared to ambient relative humidity.

Because treatment of ponderosa pine had never been done at this scale, the sawmill worked closely with Ballard and experts from The Center for Advanced Wood Processing at the University of British Columbia's Faculty of Forestry to design a process to reduce drying defects significantly. Based on their calculations, Ballard determined that the kilns required 900 gallons, or 3,400 liters, of cold mist per hour.

The solution

A **powerful** and **flexible combination** of a Danfoss PAH pump, frequency drive, valves, and nozzles

Ballard designed a high-pressure cold-mist system built around a Danfoss PAH 63 pump, a Danfoss Aqua Drive VFD, eight Danfoss 15 l/m valves, and no fewer than 180 Danfoss high-pressure nozzles – in conjunction with a range of carefully configured temperature and humidity sensors installed in the kilns by the customer.

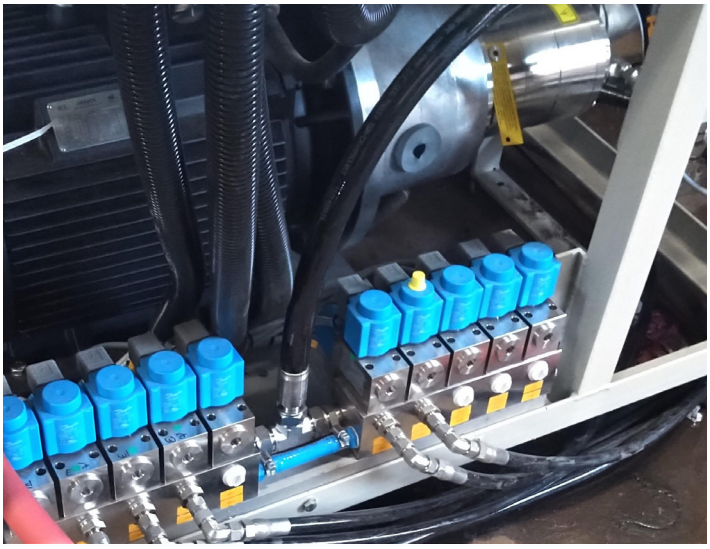
"The beauty of this system is its combination of power and flexibility," he explains. "The PAH 63 is powerful enough to give us a full 1350 gallons (5110 L) per hour, plenty to supply both kilns and more, later, if that is needed. But because we configured the system with eight valves, we achieve exceptional flexibility with how and where we deploy that moisture throughout the kilns and treatment cycle. Each valve is controlled separately so we can control humidity very precisely throughout multiple micro-sections within the large main kiln, but also in the smaller secondary kiln. The PAH 63 gives the customer both lower CAPEX, as we have one pump to do it all, but also lower OPEX, as it's the most energy efficient high-pressure pump on the market."

The result:

Efficient, reliable treatment and high-quality lumber

Since the cold-mist system went online, the customer has been very satisfied with results.

"Processing ponderosa pine at this scale is a real achievement," shares Ballard. "With so much of this valuable wood in a kiln of this size at a time, there is inevitably a lot of variation in moisture content between boards and even within boards. Danfoss gives us the ability to control things that were previously very difficult to manage, so operators can oversee the drying, equalizing, and conditioning of large batches at one time. This has enabled the sawmill to increase the share of selected grades they can sell, all while saving on CAPEX and OPEX. We are confident that this will not be the last time we are involved in an optimization project for ponderosa pine, and that the solution is also relevant for other wood types."



The combination of PAH 63 high-pressure pump and valves enables flexible and precise humidity control

About Sawmill MD

Sawmill MD is a North American leader in sawmill consulting, production equipment configuration, and sales of advanced machinery and technology. Drawing on their long and varied experience in sawmill operations, equipment/process/profitability optimization, vendor management, and digitalization, principals Mike Ballard and Duncan Ferguson help customers throughout the United States and Canada make better products with less energy and lower operating costs – and improve the working conditions and quality of lives of their employees. For more information, visit ***https://sawmillmd.com.***

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