DEHUMIDIFICATION DRYING SIZED FOR THE WEST COAST

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Dehumidification has now been marketed for over six years on the West Coast of the U.S. and of Canada. In certain regards it has been a slow penetration, not so much because of the products or the principals of operation, but mainly because we still have not recovered completely from the 1981 recession in the lumber industry.

This crisis has brought about fundamental changes in the orientation of the industry. From high production volumes, now the industry is aiming towards higher quality products, better yields and more re-manufacturing. These fundamental changes have been very apparent in the last year on the West Coast.

One of the most important steps in achieving these better quality products lies with the kilns. From black magic to computerized controls, from conventional to dehumidification, even operators are now consulted by management to improve quality and to modify the kilns to better fill their needs and improve profits.

To say dehumidification is well known would be wrong. Many misconceptions are still present and are fueled by manufacturers who know refrigeration equipment very well, but know very little about drying lumber. We still, in 1986, hear claims that dehumidification can do the same things as a conventional kiln in regard to temperatures, drying times, and worst of all, that they can be operated with the same control philosophy.

The recession did not only hurt the lumber industry, but also those who do research for it. Unfortunately, because of budget cuts, very few lumber drying specialists in the universities and research facilities of large companies, have been able to spend the time to thoroughly investigate the true nature of the process.

For the first time to my knowledge, we will have reports from drying specialists on West Coast species during this meeting.

For the past few years, I have addressed in these little talks the philosophy behind dehumidification.

This time around Charlie has asked if it was possible to review capital cost, energy requirements and drying times for the West Coast.

Let us first look at sizing dehumidifiers. It is becoming obvious that we cannot size operations on the West Coast with the same parameters as elsewhere in North America. In the east, most kilns are very specialized, and divided in four basic categories: first, those drying oak; second, those drying general hardwood like maple, birch, beech, which have relatively the same drying times; third, the low density hardwood and high density softwood, namely eastern white pine, poplar, etc.; and fourth, those drying spruce and fir.

For each of those, a specific sizing is simple. But on the West Coast, the predominant hardwood, alder, has a high moisture

content and the softwoods are also plagued with the same problem relative to drying.

Therefore, most applications will call for 1.5 hp per 1,000 fbm. Therefore, a 100,000 fbm kiln would necessitate a compressor driven by a 150 hp motor. Total horsepower including blowers and fans should be around: 225 hp or 170 kw.

Air flow design in a dehumidification type kiln is less critical than in a conventional kiln. The only real parameter to respect is not to have wet spots, or in other words, to have an even air flow top to bottom and side to side. This is achieved mainly by the plenum size at each side of the load and use of proper baffling. Air velocities near 450 feet per minute are adequate. Because dry air is supplied by the dehumidifier, there is no benefit to increased velocities across the load, since only a portion of the total circulated air goes through the equipment. Also we want the air incoming the cold radiator to be as high a relative humidity as possible to increase the water extraction from the equipment. A velocity of 450 feet per minute across the load is high enough for the lumber and low enough for the equipment to receive high RH air.

CAPITAL COST

Equipment prices per MFBM decreases as size increases. A 40 hp unit with appropriate hardware for a kiln of 25 to 30,000 fbm will run approximately $35,000, as were a 350 hp unit capable of drying 225,000 fbm will sell for near $200,000.

Building cost in the United States is $25 to $30 per square feet. On a kiln 25 to 30,000 fbm, costs run approximately $30,000, and a 225,000 fbm building would near $175,000.

Adding electrical installation cost and other miscellaneous would see the ready to run cost of a 25,000 fbm kiln at $80,000 (3.20 per board feet) and a 225,000 fbm track turn key installation would total $500,000 or $2.15 per board foot capacity. Intermediate installations can be roughly estimated using a direct relationship.

ENERGY REQUIREMENTS

Here are some energy requirements for drying Western species in kwh per 1,000 fbm from green to 15% MC.

2 x 4 lodge pole pine	90 kwh/1,000
2 x 4 western hemlock	180 kwh/1,000
2 x 4 Douglas fir	162 kwh/1,000
1 inch alder	325 kwh/1,000
1 inch interior cedar	130 kwh/1,000
2 inch interior cedar	260 kwh/1,000
1 inch coastal cedar	300 kwh/1,000

DRYING TIMES

2 x 4 lodge pole	55 hours
2 x 4 western hemlock	110 hours
2 x 4 Douglas fir	95 hours

1 inch alder	7 days
1 inch interior cedar	65 hours
2 inch interior cedar	120 hours
1 inch coastal cedar	120 hours
2 inch coastal cedar	10 days

These drying times may vary from region to region.

CONTROL METHODS

Many new computer control systems are now on the market and many interesting ideas are coming forward. But beware not to be subdued by fancy bells and whistles which are high priced and do not really improve kiln performance. We are still relying on indirect means to control lumber quality. Not yet do we have at our disposal a direct measuring method for what a specific load of lumber may endure before being affected by noticeable degrade.