DEHUMIDIFIER KILNS — CONTROLLED BY COMPUTER

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The Department of Labour in Zimbabwe, according to the C.B.C. radio, February 21, has noted a problem with maze workers (corn farmers to us). They are dying on the job. It seems that wild boars are prone to destroying the crop at harvest time. To preserve the crop, marksmen patrol the fields.

You, who have walked in a corn field, may appreciate the other name for corn: "maze."

The marksmen in the field, on hearing heavy breathing and grunting of a well fed boar shoot on sound, as no one in their right mind wants to stumble upon a wild boar. The marksmen are very accurate! Consequently very few boars survive.

The problem is that some workers sit down to pick the corn. After eating they have been known to nod off. In the corn field, heavy breathing and the occasional grunt brings volleys of shots and near certain death.

It is rumoured that Zimbabweian marksmen are here tonight. Therefore, I make three suggestions:

1) I will not bore you.
2) Please, if you feel like nodding off, lie down and breathe quietly, and
3) If you hear someone sleeping near you, get out of the field of fire.

NOTE: This was a slide presentation and only a summary of the slides are given.

SLIDE 1. Crown Forest, Fraser Mills has built eight dehumidification style lumber kilns with start up at year end 1986.

SLIDE 2. Yes, we have conventional kilns. These kilns were built in the late 40s. Seven double track and 2 single track, muzzle loaders of approximately 100 MFBM per track, steam heated, line shaft fans. They dried a lot of lumber! Yes, we probably wrote a story in the late 70s that coastal kiln drying was passe and for a number of years, no drying was done.

Yes, we restudied the situation and the old kilns:

1) Structurally: in great need of repair
2) Location and flow: very poor considering the demolition of stacker/unstacker and associated planing and trimming
3) Control system: crude
4) Air flow: very tired

SLIDE 3. The results indicated a need for drying of quality lumber: 1) in small volumes, 2) very well controlled to minimize degrade, and 3) truck oriented.

So, 8 side-loading, 40 MFBM kilns were constructed. They are radical in some ways, but generally, they are very conventional.

SLIDE 4. Perhaps a look at a section view drawing will help. The salient features are:

1) slab on preloaded grade
2) precast concrete walls, beams and roof (active conc.)
3) 28' deep x 27' wide x 20' high
4) fork lift serviced
5) packages 4' wide x stacked height to 7'
6) 2 high in multiples of 26' long
7) 4 rows deep, side shifted to end seal alternate rows
8) doors, easy one-man operation though they weigh 1,500 lbs.; man doors between chambers for access
9) ceiling baffles to deflect airstream
10) circulating fan beam complete with sealing flaps
11) load stops and anti-tipping bars
12) air filter
13) gallery, or machine corrider
14) air handler and refrigeration package
15) air return duct with pre-heat coils and conditioning nozzles
16) R20+ insulation
17) all built into an existing shed

SLIDE 5. Once the main doors are jacked up and slid aside.

SLIDE 6. A 25K fork lift can unload and reload a kiln under an hour.

SLIDE 7. You can see the circulating fans, sealing flaps and return air ducts at the mid span fan beam of precast concrete and the 14' x 8' precast panels.

SLIDE 8. Here you can see the precast concrete 8' x 20' wall panels, load stops, air baffle TW/TD and the filter for the air entering the dehumidifier units. Only the outer walls of ceiling are coated.

SLIDE 9. The gallery with the eight Uraken 75hp dehumidification units with control panels. Kiln air is sucked through the filter on the 6' x 8' wall openings, through the evaporator or cold coil to drop out the water, then through the condenser or hot coil to reheat, and then the 25 hp blower fan and out the top duct through the gallery roof.

SLIDE 10. And returned to the kiln. Here, you can see the preheat coils and valve for conditioning spray. Preheat takes less than 4 hours.

SLIDE 11. Doug Stevens is the kiln supervisor. We follow him as he checks wood moisture, TW/TD, filters, etc., in the kilns. Note, the environment generally is quite comfortable as TW = 105'F with 30'F depression.

SLIDE 12. Next the extraction rate of the units is logged. That's the gallons/hour being drawn from the wood.

SLIDE 13. Suction pressure of the refrigerant along with its visual condition, and oil levels are checked and logged. Perhaps a short walk through the refrigerant system might help at this point. The 75hp motor drives the Carrier compressor which takes R12 gas from the suction receiver at about 55psi, compressing the gas to 350 psi and flows to the condenser coils releasing heat to the kiln air as the refrigerant goes from gas to liquid state. The gas flows back to the liquid receiver and through a filter/dryer and back to the air handler via a solinoid control valve. The liquid refrigerant flows through the T X or expansion valves to the evaporator where the energy required to allow the refrigerant to expand from liquid to gas state is removed from the kiln air, lowering the dew point and the dropping out water at the evaporator coil. The water is sewered.

SLIDE 14. Each kiln has a control panel. Switches are left in automatic and the units are operated remotely. Hand controls are provided but rarely used. Safety lock-out is by the main disconnect. Independent TW/TD is provided along with a compressor hour meter.

SLIDE 15. The control room contains the A-B PLC which is the system programmable controller and the IBM-PC used for interigation of status, programme changes, logging of data and trouble shooting.

SLIDE 16. The PLC once programmed can function without the IBM. A kiln can be started with this button. The status seen; Preheat, Run (drying), End (of drying), Conditioning, and Trouble. This one is indicating a circulation fan problem.

SLIDE 17. The PC programme is user friendly, step through style format. The display, one of approximately 20, can be printed.

SLIDE 18. As there are a number of variables in drying and extended time. The IBM/PLC approach seems warranted, especially with eight kilns.

SLIDE 19. Though the structure and the systems are important the basics should not be overlooked.

SLIDE 20. Well sticked loads on correctly placed dunnage, loads placed with some thought as enhancing the air flow.

SLIDE 21. Controls and checks during drying.