LET'S RE-EVALUATE DRY KILNS

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The subject of this discussion is probably confusing to you. Over the past 25 years I've sat in on many dry kiln meetings and on occasion I have been a speaker. I have been troubled for some time on what to talk about that would be interesting and beneficial to dry kiln audiences. Keeping these thoughts in mind and coupling this with the great variation of the new dry kilns that have been built in the past several years, I felt that it might be well to stop and re-evaluate the dry kiln specifications into today's demand for reduced product cost.

I felt that in re-evaluating the 5 basic dry kiln areas that we could touch upon something that would be of interest to all of you. Something that you came here wondering about - for some the dry kiln building - for others steam heated kilns - gas or oil fired kilns - the kiln machinery - and for others, what's the status of high frequency or micro-wave drying. My five basic dry kiln areas are:

1. THE DRY KILN BUILDING
2. RADIATION
3. CIRCULATION
4. VENTILATION
5. HUMIDIFICATION

(1) Most common dry kiln building today can be sub-divided into: 2 major designs

   (1) Expanded shale block walls - or concrete formed on the ground (tilt)
   (2) Insulated metal walls with the roofs sub-divided into:
       Insulated metal
       Expanded shale concrete prestress, formed on ground and cast in place, transite and zonolite and transite cavity

These are probably the two most common kiln buildings today. The expanded shale concrete block with a heat transfer factor of around 0.16 and the aluminum skin insulated wall panel with fiberglass or polyurethane insulation with a similar U factor. The aluminum however does deteriorate and is "eaten thru" by the acids and the many aluminum kiln buildings are then painted. You can no doubt give me several pros and cons for each of these designs - I certainly can give you several.

The roof of the dry kiln has always been a topic of great discussion and rightfully so - it has been the source of many problems. It looks as if some of the newer designs will prove to be the answer to the problem. Expanded shale prefab - Prestress - 1 day to put on - Roof vent openings okay. I might add that the expanded shale concrete roof, either prestressed or preformed is looking very good. Expanded shale concrete roofs that have been poured in place on high temperature and regular temperature kilns have now been in service for over 10 plus years with excellent results. The heat transfer rate is very low and placing your hand on the roof in cold weather you get only a cool feeling. The outside or top of the roof is treated with a silicone wash and the inside with a kiln penetrator and kiln coater. With the advent of pressure venting, this kiln roof now becomes just a kiln roof and the many previous areas of rapid deterioration around the roof vents has been eliminated. So much for building which we could talk about for many hours.

The four horsemen of the dry kiln equipment have been upgraded in the past 25 years. Much of the credit must go to the gentlemen who have had the vision, confidence and desire to keep new equipment abreast of the advanced designs.

In the past we used 40 horsepower on a two track 104 ft. long kiln. Even then test after test showed that we were using only 25 to 30 of the available horsepower. Today we use 72 horsepower and we design the equipment to run at the design of the horsepower. Where 30 horsepower was used on a single track 104 we now use from 48 to 60 horsepower. This increase in horsepower made it necessary to increase the footage of radiation within the dry kiln.
It was found that copper finned radiation or integral aluminum fin copper sleeve radiation helped to reduce the number of feet required in a dry kiln. As you know it takes only one foot of 1" pipe with steel finned radiation to do the job of 4-1/2 ft. of 1" plain pipe. When using copper finned or Bi-metal finned pipe, it requires only 6" (six inches) of this pipe to replace 4-1/2 feet of 1" plain pipe and one ft. of steel finned pipe. Visualize the reduction in static pressure hanging systems, weight on the cross members and efficiency of the kiln.

Where old designed kilns could bring a charge of 32° unfrozen Ponderosa Pine sap 4/4 lumber up to 160° F in 12 hours the modern or advanced design kiln brings it up to 180° in less than 6 hours.

Air speeds have changed from 250 ft/M to 325 ft/M in the older kilns to over 700 ft/M leaving air in the newer designs (this is why greater radiation is required).

Pressure venting is instantaneous - it's either off or on and the heat loss in the roof vented kiln is greater due to the slow closing of the vents. Also exhaust and intake of pressure venting different volumes which is economical and pressure venting should save a minimum of over 5 percent in heat - BTU'S required.

With faster heat up the traps must be fast acting and down through the years we have moved away from the bucket type to the much smaller rapid acting type.

Humidification is controlled through desuperheaters to approximately 15 psig 250° F. A series of adjustments to steam and water make this a variable condition that can be set to the characteristics of the dry kiln.

YOU MIGHT SAY - WHY ALL THIS SPEED - WHAT ABOUT QUALITY. We have found the quality is being upgraded with the newer advanced design kilns because you have the capacity of the equipment to set a schedule and dry the lumber at a rate that it will take - etc. etc. It is not uncommon with these new air speeds and fast heat to cut two days from a drying schedule.

We haven't stopped trying to do better and our research continues to spend money to investigate many other ideas which have included the high frequencies from induction heat, HF, UHF, radio 915 micro and 2450 micro.

I could go on and open up on any of the above subject but feel that this has given you a fast re-evaluation of our 5 basic dry kiln areas and it should have touched a responsive area in each one of you. It is no doubt a handicap to mention any of these subjects with so little time to go into full detail.

There should be many questions and with the several experts I see in our group I'm sure that as you stump me that we will be able to get the answer from one of them. Who has the first question?