

RELATIONSHIP OF VENEER DRYING TO LUMBER DRYING

By

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of

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OPENING REMARKS

Mr. Chairman, Ladies, Club members and visitors:

(Comment on introduction if appropriate and tell story on Bob Inglis if he makes introduction - story on burning down his kiln.)

It appears that those of us attending these annual meetings never let our enthusiasm reach 0% EEC (Equalibrium Enthusiasm Content) and/or our knowledge reach 100% saturation, or we wouldn't be here at the 18th Annual Meeting. Nice to see so many familiar faces and also so many new ones.

When your general coordinator Lee Rappleyea asked us to prepare and present a topic subject on veneer drying and its possible relationship to lumber drying we adopted the same philosophy as the 1/2 Japanese and 1/2 Jewish boy - "Every December 7 he attacked Pearl Schwartz."

We never learned of the success of his venture, but at least he tried - so here we are.

I've asked Bob Inglis to act as Judge Roy Bean during the short question and answer period at the conclusion of this session, so please address any questions to the Judge at that time.

(Judge to have pistol and jug of whiskey - shoot directors of bad questions- pour a drink for directors of good questions.)

INTRODUCTION

Prior to 1950 we found that within the Timber Products Industry a plant was either basically a lumber producer or a veneer and/or plywood plant, Some plants were integrated and produced both lumber and veneer; however, they were the exception rather than the rule.

Today through the medium of integration, diversification and utilization many plants are now producing both lumber and veneer.

The actual utilization or useable recovery of material from the log has been a contributing factor in many companies entering into the veneer and hence into the plywood field. For example; from an 18" diameter log when peeled down to a 5" core, we can obtain a 92% yield - yet this same log will only yield 72% of its volume when cut into 1" lumber.

Some of us, previously associated with just the seasoning or drying of lumber, now find we are being exposed or responsible for the drying of veneers.

1. Is there a similarity to these two drying techniques?
2. Are there basic differences?
3. Can the operators of one process learn something from the operators of the other process?

Winston's Dictionary, 1933, defines lumber as, "a forest timber sawed ready for market" and veneer as, "a thin surface of fine wood overlaying wood of a poorer quality."

From our viewpoint and daily use even these definitions have been drastically changed. I believe most of us here today agree that lumber is "a sawn piece of wood 2" or less in thickness and veneer as a peeled or sliced piece of wood 1/4" or less in thickness."

Plywood is a man made assembly consisting of two or more layers of veneer or laminates glued together.

BRIEF HISTORY

The birthdate of lumber seasoning is given as approximately 735 B. C. with interest here in the United States reaching the point that the first patent for lumber drying was issued in 1862 with four more patents issued in 1866. As of 1959 over 300 patents had been issued for kilns for the drying of lumber and many more for accessory equipment.

The history of veneer is naturally associated with the history of glues and within itself this history is of academic interest.

Caskets and murals found in Egypt place the use of veneers and glues at approximately 2000 B. C. These early veneers were assembled using page and glue. Interestingly these early glues were of the egg or albumin and blood type and with very minor changes these same glues are still in use.

The first commercial glue factory was founded in Holland in 1690 and here in the United States in 1808.

Early veneers were hand sawn - similar to the Japanese method of whip sawing timbers, and mechanically sawn after 1805. The forerunner of the slicer came into being in about 1830 and the rotary peeler in about 1870. This rotary peeler was a major forward step in the veneer industry. Today approximately 97% of all veneers produced are peeled on the rotary type lathe.

The development of today's modern roller veneer dryer started with air drying and this led into the use of veneer kilns which were and are quite similar to our conventional lumber kilns.

When drying veneers within kilns the sheets of veneer are stacked within racks or stacked similar to lumber, but with release stickers to allow the veneer to shrink. The release stickers become the load bearing points.

Veneers have also been dried in units similar to the progressive lumber dryers or tunnel kilns.

Another novel and yet successful method for the drying of veneers has been the use of steam heated oscillating platens. As the platens open and close mechanically, the veneers are moved progressively between the platens and are dried.

The first American steam heated roller dryers came into use in 1902 and were of the multiple deck longitudinal type. The first unit had the rolls held in place between two 2x4's. The rolls were driven with a line shaft and bevel gear drives.

The late Forties saw the development of the cross-circulation and direct gas fired roller conveyor dryers with the jet types being commercially available in the Sixties, or only about six years ago.

Conveyor dryers are usually a rather large insulated box approximately 20' wide - the height a function of the number of decks - 3 to 8 in number and in length from 24' to 200' depending on the capacity needed or to be handled through the dryer.

The decks or lines of conveyor rolls are on 12" or 15" vertical centers with pairs of rolls on 5½", 7", or 9" horizontal centers. Rolls are approximately 3-¾" in diameter and 15' long with the bottom roll driven by a conveyor chain and the top roll by a toothed gear from the bottom roll. Thus the two rolls develop a pinching action that carries the veneer through the dryer.

Dryers consist of sections 5'3" or 6'0" long and one or more sections making up a zone. Each zone has its own circulating and heating system.

Air patterns are either of the longitudinal, cross-circulation, or jet type.

A FEW COMPARISONS

Disregarding any particular species but limiting ourselves to our western softwoods, let us establish a basic comparative picture between lumber and veneer before we look at their possible relationship. We can all agree that they both are produced from the heterogeneous material called wood, but from that point on -- well, let's see how they do compare:

LUMBER VERSUS VENEER

<u>Item</u>	<u>Lumber</u>	<u>Veneer</u>
1. Length	6' to 20' in 2' increments	4' to 10' in 1' increments
2. Width	3" to 24"	6" to 27" in random widths & 27½" & 54"
3. Thickness	1" to 2" in 1/4" increments	1/10" to 1/4"
4. Moisture Content Range	30% to 300%	30% to 300%
5. Moisture content segregations made prior to drying	None or heart & sap or light & heavy or corky & sinker	None or heart & sap
6. Desired final dry moisture content ranges	Clear & selects 8% to 10% Commons 12% to 16% Dimension 15% to 19%	Hot press - 6% max. Cold press - 10% Max.
7. Shrinkage (1)	Up to 75% of the possible 5% in the radial direction & 8% in the tangential direction	Up to 100% of the 8% tangential direction
8. Drying defects	Stain, cup, twist, bow, surface checking	Stain, waviness, surface deterioration
9. Basic method of drying	(1) Charge (2) Progressive	(1) Progressive (2) Charge

From a seasoning viewpoint the three main differences appear as items (3) thickness, (7) shrinkage and (9) basic method of drying.

(1) Because of the low longitudinal shrinkage .1% to .3% we are disregarding longitudinal shrinkage at this time.

BASIC METHOD OF DRYING

The preceding simplified chart for the general comparison worked so well, let's use it again but this time confine our items to those relative to the drying operation.

<u>Item</u>	<u>Lumber</u>	<u>Veneer</u>
1. Material to be dried	Stationary	Moving
2. Air velocities	250% to 700'/min.	1500 to 3500'/min.
3. Dry bulb temperatures	160° to 230° F	350° to 450° F
4. Wet bulb depression	5° to 50° F	Unknown and uncontrolled
5. Drying time	Increments of hours and days	Increments of minutes & 1/4 hours
6. Shrinkage	Radial & tangential piece held stationary	Tangential only piece allowed movement
7. Moisture contents	Definite ranges above 0%	Top limit & down to 0%
8. Moisture content control	Representative sampling of approximately 1% of the volume handled	95% sampling of the volume handled
9. Attendance	Attendance at equipment approximately 25% of the equipment operating time	Attendance at equipment 100% of the equipment operating time & maintaining an hourly log

RELATIONSHIP OF VENEER TO LUMBER DRYING

1. The drying curve of veneer is normally much steeper throughout than that of lumber. This is primarily due to the thickness differential and because of the many fine checks within the veneer surfaces made as the veneer is literally torn or peeled from the log.

2. Higher temperatures and air velocities can and are used in drying veneer because of the thicknesses involved, the relatively short moisture travel required within the piece, and because the problems relating to shrinkage are limited to tangential shrinkage and the ability of the veneer sheets to shrink in width.

3. The final moisture content is more easily controlled within veneers as we are working with a minimum moisture content rather than a definite range and thus can use the 0% point as a limit on the low side rather than a definite moisture content percentage.

4. The retention of knots is ignored as we can either use the piece as core or through plugging or patching equipment replace the defective area with sound wood in the form of an inserted piece.
5. The layup or gluing of the veneers into plywood builds in the dimensional stability that we as kiln operators attempt to secure by uniform moisture content within the individual board.

CONCLUSION

We as lumber kiln operators and management personnel can obtain faster drying and more uniform drying by taking a good look; in fact, stealing a leaf from the basic equipment design of veneer dryers and their operation. Those items worthy of serious consideration include:

1. Better and more uniform stacking to insure that the circulated air and temperatures reach each and every piece.
2. Better and more uniform kiln baffling to insure the circulated air is getting to the lumber, not bypassing it.
3. Increased air volumes and uniformity of air to reduce drying time and improve uniformity of drying.
4. Increase in percentage of volume of moisture content sampling or use of continuous moisture detectors.
5. Improvement in the collection and tabulation of basic data relative to each kiln charge.

O. K., Judge Roy Bean, the floor is yours!!!!

BIOGRAPHICAL SKETCH

EUGENE L. BRYAN is presently an Associate Professor at Humboldt State College, Arcata, California, where he teaches wood science courses in the Forestry Department. Gene received his B. S. degree in forestry from the University of Idaho, M. S. degrees in wood technology and in engineering science from the University of California, and his Ph.D. degree from the University of Michigan.

Dr. Bryan was with the California Forest Products Laboratory for five years where he did research on particleboard, fundamental properties, kiln-drying, and collapse removal. At the University of Michigan, he studied the use of lasers and high-energy water jets for wood machining. Prior to his recent appointment to the staff at Humboldt State, Gene was Research Manager of the Black Clawson Wood Processing Laboratory in Everett, Washington where he established and directed a research program for automated wood processing equipment.