	NORTH CAROLINA DEPARTMENT OF LABOR	**No. 24-2**
	OSH DIVISION	**Date: 10/2009**
	OSHNC INDUSTRIAL DATA REPORT	**Pages: 5**

Industry: **Lumber and Wood Products**	Sub-Group: **Plywood and Veneer**
SIC: **2435 and 2436**	NAICS: **321211 and 321212**

PROCESS DESCRIPTION: The first few phases of plywood or veneer production are essentially the same as that from almost any other sawmill. The logs are received, debarked and cut on headsaws in the same manner. In most cases, however, cants or lumber are not cut. For veneer (fine or high grade hardwood), if the log is 32 inches or less in diameter it is cut into halves; if over 32 inches it is generally cut into quarters. If logs are small and intended for plywood only, they will not be cut by headsaw but bucked into length and go directly to a steam or hot water vat or tank for cooking.

In veneer production the logs are placed in a cooking vat which is approximately ten feet deep and eight feet by 20 feet. The temperature is raised 5-10 ºF per hour until it reaches approximately 140 ºF where it is held for 24 hours, then up to 200-220 ºF where it remains for from one to five days depending on color desired. The "flitch", as it is now called, is removed from the cooking vat, cleaned, planed and ends trimmed or cut off. Then a backing board is applied by glue. (This operation allows more veneer to be cut from a single flitch). Once backing board is applied with glue or cement it is placed in a flitch press to secure a proper bond. The flitch is placed in a holding tank of splashing hot water. The tank is approximately 25½ inches deep. When ready to be cut, the flitch is placed on a "Stay-Log Table". The cutting knife is set in position in a frame approximately 45 inches above the work platform. The knife is stationary and the Stay-Log table moves up and down to cut or slice veneer. The tables make approximately 70 strokes per minute and cut a 12 foot slice. From here the veneer is moved to the sweat or holding room where it remains until the desired color is reached. Forklift trucks move veneer out of the sweat room to the dryer where it is hand fed into the jet or fan dryer. A conveyor carries the veneer through at a speed of 8-15 feet per minute and at a temperature of from 90 to 120 ºF. After drying it goes to the clipper, then it is packaged and stored or shipped.

If plywood is to be made, the logs are debarked and cut into 8-10 foot lengths referred to as blocks. The blocks are steamed to soften the wood fibers. The time and temperature requirements will vary according to wood species and desired depth of heat penetration. This process is generally of a shorter duration than with pure veneer production. When this softening process is properly performed, the resultant benefits can be smoother veneer with a reduction of checking or fracturing of wood fibers, all of which are assets in the latter stages of plywood manufacturing. The most common method of producing veneers (or plies) is by rotary cutting on a lathe. Rotary lathes are equipped with chucks attached to spindles and are capable of revolving. Large blocks are moved to the lathe charges. Their purpose is to position blocks to receive the lathe chucks. The blocks are chucked either in their geometric center or the heart center of the block. After the block is in place the chuck revolves the block against the knife and the veneer "peeling" begins. The thickness of the veneers will range from 1/16 to ¼ inch and the mill will usually seek to produce a standard thickness for the plywood they are producing. Softwood blocks are cut at high speed and veneer coming from the lathe is fed into a belt conveyor. The number and length will vary from mill to mill. Positioned along the belt conveyor are rotary clippers that cut the veneer to desired size. This operation takes place along the "Green chain."

From the "green-end" the veneer goes to dryers much as in the pure veneer production. Some direct-fired dryers have temperatures up to 500 ºF. Most common maximum temperature is less than 400 ºF. The dry veneer is graded and stored according to the width and grade. After drying, the plywood is built by placing each layer, or ply, at right angles to the grain of the core. This cross-lamination produces strength and rigidity. Plywood is constructed with an odd number of plies such as 3, 5, 7, 9, 11, etc. Prior to laying up of the layers, each ply is run through a glue or adhesive spreader. After the glue is applied and the layers stacked, the plywood is placed

into presses. Here, pressure (170-2,000 psi) and high temperature are applied for 12-15 minutes. The wood panels are then removed, cut to size (usually four feet by eight feet) and then sanded and stored or shipped.

PROCESS FLOW:

Veneer Mill

Log Storage Yard
↓
Debarker
↓
Head Saw
↓
Cooking Vat
↓
Flitch Backing, Cleaning and Trim
↓
Veneer Cutter
↓
Sweat Room
↓
Dryer
↓
Clipper
↓
Package and Ties
↓
Store or Ship

Plywood Mill

Log Storage Yard
↓
Debarker
↓
Log Bucking
(Cut to Blocks)
↓
Steam Room
↓
Lathe
(Rotary Cutting)
↓
Clipper
↓
Dryer
↓
Glue Spreader
↓
Lay-Up
↓
Press
(Temperature and Pressure)
↓
Cut to Size
↓
Sander
(Belt or Drum)
↓
Store or Ship

Hazards Analysis

Major Hazards			Other Hazards		
Location	**Item**	**Hazard**	**Location**	**Item**	**Hazard**
Log storage yard	Logs in piles and stacks, forklifts, mechanical lifting devices, cables, binders and unloading trucks; vehicular accidents	Crushed limbs and body; carbon monoxide	Debarker	Log deck, chain conveyor, log flippers, pike pole peavey, barker head, log hold down rolls, flying bark, noise, steps, walkways and foot treadles	Amputations, lacerations and crushed limbs; eyes injuries; slips, trips and falls; sprains and strains
Head rig	Head saw, log carriage track, log deck roll cases, conveyors Open motors and electrical equipment, chips and dust; electric shock, fire and explosion	Amputations, lacerations, bruises, slips, trips, falls, strains and sprains Burns, smoke inhalation and exposure to toxic air contaminants	Veneer slicers and rotary cutters (stay-log table and lathes)	Veneer slicers, blades, carriage, power drive gears, chains, belts and rotary cutter	Amputations, lacerations, bruises, sprains and strains, and crushed limbs
Log bucking or block cutting	Open vats and tanks, live steam lines and outlets, falling “flitches” or “blocks,” walkways, buck boards hoist, slings and cables	Burns to eyes and body; slips, trips and falls; crushed and bruised limbs and body	Clipper	Clipper, knife, power drives, belts and chains, etc.	Amputation, lacerations, bruises, crushed limbs and body
Flitch cleaner/planer and board	Flammable glue, chain saws, flitch	Lacerations and bruises, slips and falls sprains and	Dryer	Heat, open chains, belts and power drives,	Burns, bruises, crushed limbs and body

backing area	planer, hoist, cables, slings or wire rope, buckboards, walkways, hot water and steam floors, fire	strains, burns and smoke inhalation		conveyors; pinch and nip points	
Hot press	Hydraulic hot press, high temperature and pressure (temps. up to 700 ºF and pressure up to 2000 pounds), in-running nip and pinch points	Burns and crushed fingers and hands	Glue spreader	Spreader roll, belts, chains, power drives, doctor roll, conveyor; in-running nip and pinch points Glue vapors and liquid chemicals (formaldehyde)	Crushed fingers and hands Eye and throat irritation, dermatitis and inhalation
Sanding area	Drum sanders and wide belt sanders, belts; in-running nip and pinch points	Eye injuries and crushed fingers and hands	Trim area	Band saws, circular saws	Lacerations, amputations and eye injuries
Throughout	Noise Wood dust	Hearing loss Respiratory problems			

Reference	29 CFR 1910 — General Industry Standards
ANSI B30.6	Overhead underhung hoists
NCGS 95-129	General duty clause - ergonomics
Subpart D	Walking and working surfaces (especially 1910.30 – veneer machinery)
Subpart E	Exit Routes, Emergency Action Plans, and Fire Prevention Plans
Subpart I	Personal protective equipment
Subpart O	Machinery and machine guarding
Subpart S	Electrical
1910.95	Occupational noise exposure
1910.106	Flammable and combustible liquid handling and storage
1910.141	Sanitation
1910.147	Control of hazardous energy (lockout/tagout)

1910.151	Medical services and first aid (especially eye wash and emergency shower stations)
1910.176	Material handling – general requirements
1910.178	Powered industrial trucks
1910.242	Hand and portable powered tools and equipment – general requirements
1910.1000	Air contaminants
1910.1048	Formaldehyde
1910.1200	Hazard communication

Inspection Analysis

This inspection will be very similar to that of a saw mill. Start with the storage yard and Ensure that logs are properly stacked with no tilting of piles, and that base logs are secure. Check proper log handling procedure and equipment. In the debarker area, observe the operator for protection from flying bark and chips, and check for unguarded mechanical power transmission equipment, walkways, stair rails and log deck. Also look at the drag saw or chain saw. In plywood mills chain saws are often used after debarking to cut logs into blocks. If head rig (head saw) is used, check as you would in a saw mill, with particular emphases on open electrical junction boxes and motors, walkways, guard rails, conveyors, protection against flying particles and log deck guarding. (Note: Remember that even though the equipment and procedures are the same, 29 CFR 1910.265 does not apply to plywood and veneer plants.)

Continue on to the cooking vats or steaming area. Note the manner of handling logs, blocks and flitches (by hoist and sling or forklift). Check depth of vat or tank, cover and walkway height above working level, water temperature, noise and personal protection.

In veneer plants, check the flitch backing area. Check flammable chemical use and storage. Check saws, planers (hand held), holding tanks, water temperature and tank heights. The next area of concern in the veneer plant is the veneer cutter. Ensure that employees are protected from the cutting knife, stay-log table, power drives, belts and chains. In a plywood mill, the lathe is important. There will probably be a pit where the knife is located. Check lockout procedures when changing knives or during maintenance.

In both types of mills observe the chipper operation. Check for in-feed and out-feed guarding, employee protection and proper guards.

The remainder of both plants requires inspection techniques similar to any plant operating equipment with power drives, in-running nip points, gears, presses, belts, saws sanders, rolls and other miscellaneous equipment.

Other Pertinent Comments: