



TECHNICAL BULLETIN

STRUCTURAL BOARD ASSOCIATION

Representing the OSB Industry

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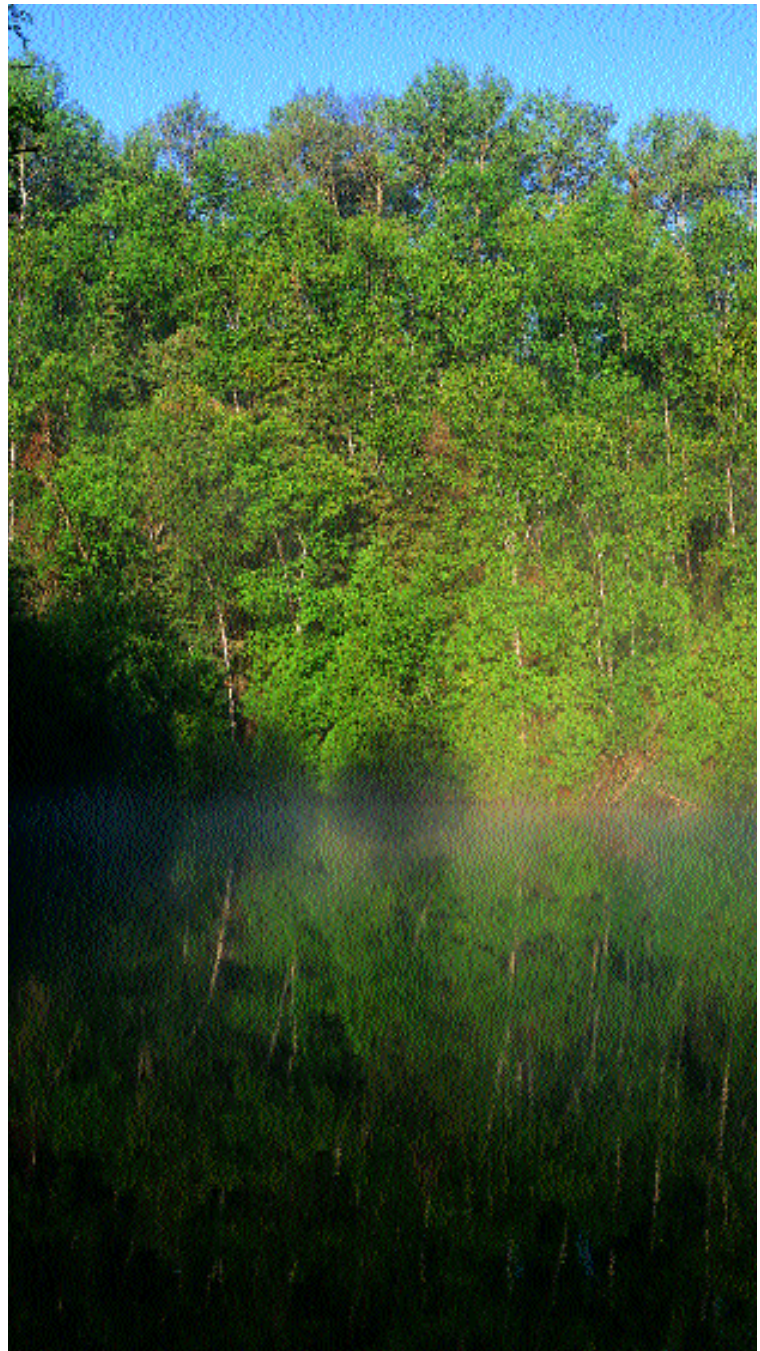
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OSB AND THE ENVIRONMENT

Oriented Strand Board or OSB is a wood based structural use panel manufactured from wood strands sliced from freshly harvested trees and bonded together using waterproof and heat proof resin binders. The product is chiefly manufactured in North America along with additional incremental production in Europe, however, OSB is used for construction and other purposes in over 50 countries around the world.

SUMMARY

- the wood used comes from sustainable self-regenerating forests or plantation/ woodlot thinnings.
- OSB mills must meet or exceed environmental regulations in their area.
- the entire tree is utilized as panel strands or as fuel for the energy system.
- all particulate matter is removed from the energy system stack gases prior to discharge.
- the resin binders are thermosetting, once cured they cannot be softened by heating. There is no measurable off gassing from the finished panel.
- OSB can be safely disposed of by burning or in a landfill.
- OSB, a wood product, uses less energy in manufacturing than concrete or steel.



Sustainable Forest Management

In North America, aspen extends across 111 degrees of longitude, from the extreme eastern tip of Newfoundland to the Seward Peninsula of western Alaska. Aspen's north south range spans 47 degrees of latitude from the Mackenzie River delta in arctic Canada to an isolated stand in south central Mexico. *Prior to the expansion of the OSB industry, aspen was considered a weed and was killed by spraying, knocked down during conifer harvesting or left at landings for burning. Today, attention is being paid to managing the aspen forests; roads and landings are replanted after harvest and aspen is included in new mixed wood forests. Unlike conifers, aspen is very effective at capturing carbon during its first 20 years of rapid growth, however it has a high rate of carbon release between 100 and 150 years which is earlier than most conifer dominated forests. Therefore, harvesting at the mature period of 60 to 80 years aids the mixed wood forest in the total fixation of carbon. After a fire, the shade intolerant aspen regenerates vigorously providing foliage cover for the return of wildlife and shade for the young coniferous under storey growth. In Canada, government owners of the forest are now insisting that environmental impact statements be developed and harvest plans, including stream and wildlife protection, be approved for aspen and birch stands before cutting begins.*

The major woodlot and plantation developments of southern yellow pine occur in the U.S. from West Virginia and Georgia to central Texas. *These fast growing forests are regularly thinned to reduce stem concentration, increase standing tree volume and enhance the commercial value of the stand as plywood, lumber and pulp fiber.* A major supply of mixed hardwood also comes from commercial woodlots as lot owners harvest the low value trees and culls to increase stand value on good growing sites. This practice will be expanded as investors realize the opportunities for profits in owning and managing standing timber.

OSB Manufacturing and the Environment

In Canada and Northern U.S.A. the tree species used in OSB manufacturing are primarily self-regenerating aspen, balsam poplar, birch and red maple. In Southern U.S.A. yellow pine from woodlot and plantation thinnings is the most commonly used species. Selected softwoods and other hardwoods are often added to the mill wood basket depending on location. In Europe, various pine species predominate, however, certain hardwoods are also used on condition of availability and cost.

OSB mills are required to meet or exceed environmental regulations in their locality, state or province. The regulations cover the impact on the environment from air and water discharge as well as noise. Therefore the principal environmental impacting sources are the log storage area, the strand drying, the panel forming and the hot pressing equipment.

Raw Material

Freshly harvested trees are delimbed and either sent to the mill log yard as whole trees or bucked at the landing into approximate 8 foot lengths. Depending on mill location, hauling distances average 30 miles (50 kilometres), however can exceed 60 miles (100 kilometres). Although trucks predominate, some wood is shipped by rail. *The log yard surface is usually gravel, and is graded so that run off can be diverted away from water courses, collected and either used in*

the process or evaporated. Many mills plant screens of trees on the wood yard perimeter to contain noise and dust. As trucks arrive in the yard, they are weighed and unloaded by mobile equipment or gantry cranes. The large piles reduce log drying as strand recovery and quality are influenced by log moisture content.

In the north, all logs are bucked to length and submerged in concrete ponds or vats prior to debarking to remove frost and loosen the bark. *The ponds are self-cleaning. The sludge is mixed with bark and burned in the waste wood energy system.*



Stranding

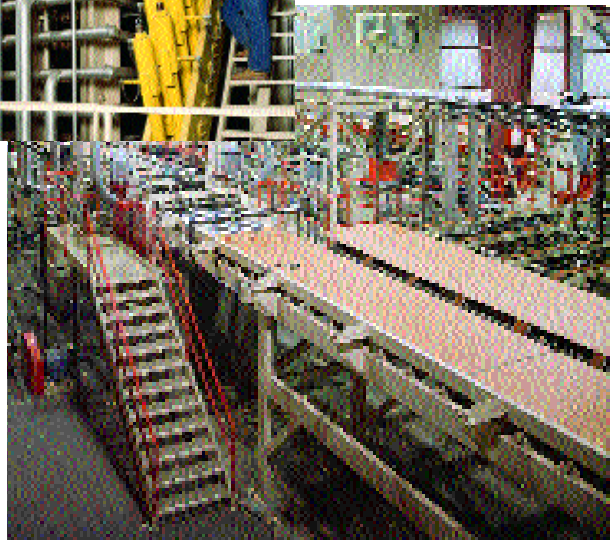
After leaving the ponds or the mill infeed, logs or blocks move continuously through the debarker to the strander where huge rotating knives slice the log along the grain into strands 25-30 thousands of an inch thick, 1/2 inch wide and between 4 and 6 inches long. The green strands are stored in the "wet bin" prior to drying. *The debarking and stranding area is usually enclosed in a separate building space to reduce noise levels in the mill area. The bark is burned in the waste wood energy system.*

Strand Drying

As strands are discharged from the wet bins, they enter one of three types of hot air dryers; the triple pass or the single pass rotary dryer or a single pass conveyor dryer. The operation of the rotary dryer tumbles the strands at the same time as they are being carried forward. In the triple pass dryer, the strands make three trips the length of the dryer before discharging versus one trip for the single pass and conveyor unit. The environmental advantages of the conveyor dryer are higher recovery and much lower drying temperatures. The strand/air mix out feeds from the dryers through a series of cyclones to drop out usable strands, precipitators to remove fine particles and carbon and finally a device to eliminate the Volatile Organic Compounds (VOCs) before the hot gases are discharged into the atmosphere. After drying, the strands are screened to eliminate a percentage of fines and then enter a "dry bin".

The hot air is generated by a separate energy system which uses screened fines, saw waste and sander dust as fuel.

The drying operation produces the highest environmental impact from the mill, therefore, it is tightly controlled for inlet and outlet air temperature, and final strand moisture content. The hot gas discharge going to the dryer stack contains a mixture of CO, NOX, VOCs and water vapor. Mills are permitted by environmental control authorities to allow only a very small amount of CO, NOX and VOCs to be discharged per ton of product produced. Failure to



consistently meet the permitted levels may result in heavy fines and possible loss of the operating license.

Forming and Pressing

In the forming operation, face strands are sent to one of two parallel discharge forming heads and core strands go to one of two cross panel discharge heads. The strands are laid down in the four layers on a moving belt to form a continuous mat which is fed into the hot press. *When liquid polymeric diphenyl methane di-isocyanate (MDI) resin is used, rather than the more common phenolic resin, the forming machine is enclosed in a curtain of clear plastic panels and vented to collect any off gassing from the resin. Employees undertaking maintenance work on the forming*

machine using MDI must wear gloves and self contained breathing apparatuses.

The mats are cut into 16' or 24' lengths when feeding a multi opening press. *End and side cut waste is collected for burning in the dry energy system unit used to heat the dryers.*

Alternatively, when using a continuous press the mat goes directly into the front end of the press.

The hot press, which may be multi-opening or continuous, has the second largest impact on the environment. *During the pressing operation, hot gases often including free formaldehyde are driven off and collected in a venting system. Depending on the permit requirements, the collected gases either go to the energy system as part of the underfire air supply, are incinerated in a regenerative thermal oxidizer (RTO) or treated with a bio-filter. Like the forming and blending area, maintenance is undertaken wearing a self contained breathing apparatus.*

Energy Systems

All OSB mills are self-sufficient in heat energy for both process and internal building heat. Today the bark fired waste wood energy system stack discharge is combined with the dryer cyclone discharge as it enters the electronic precipitator where any airborne particles are removed and depending on permits next goes through the RTO for removal of VOCs. The sludge from the precipitator is usually taken to a land fill.

Binders and Waxes in OSB

Phenolic resin binders in powder or liquid form are the most common binders used to manufacture OSB as well as plywood, glass fiber insulation and other building products. *These resins are thermosetting; once cured, they cannot be softened by heating. They are extremely resistant to water and will not break down in the presence of moisture.* Phenolics have been used in a variety of applications for over 100 years and as wood panel binders for the last 65 years.

Liquid MDI binders are an approved alternate binding system used by approximately 35% of the OSB mills (alone or in combination with phenolics). They bring to wood composites, the same advanced polymer technology used in engineering thermoplastics and polyurethanes.

Most OSB producers use small amounts of slack wax which is a by-product of the lube oil process and has proven to be a cost effective sizing agent for use in composite panels. Wax emulsions are also used as the small wax particles are thought to contribute to better distribution of the wax onto the strands. The high melt waxes typically used in the OSB industry normally do not contribute much to the total environmental loading at the hot press.

Off Gassing

The resins used in OSB manufacturing are designed to completely cure during the hot pressing operation. However, there are some gaseous compounds released from the wood itself due to the high temperatures needed to

cure the resin. Therefore, SBA mills hot stack panels for at least 48 hours after trimming to allow these gases to dissipate. During construction of a building some panels are resawn and the heat from sawing will release some of the natural gaseous compounds, however they dissipate quickly.

Disposal of OSB

After considerable study and sophisticated testing, researchers under contract with SBA at the Forintek Canada Corp. Eastern Laboratory in Québec and the Minnesota Natural Resources Research Institute (MNRRI) in Duluth, MN have determined that there are no additional VOCs released from OSB when it is burned or placed in a landfill than what is released from solid wood. Therefore they have concluded that OSB can be safely disposed of in either manner.

Wood vs Concrete and Steel

In 1996, research was undertaken by Forintek Canada Corp. along with representatives of the concrete and steel industry to develop the ATHENA™ model to compare energy use and CO₂ generation in the manufacturing process. The model has proven a reliable forecaster to determine this data. *The data shows that wood products including OSB have lower CO₂ and use less energy during manufacturing than the other two products.*

REFERENCES

- SBA Technical Bulletins Binders and Waxes in OSB
Oriented Strand Board in Landfills
Ecology and Management of B.C. Hardwoods, ISSN 0835-0752



OSB used in wood frame construction provides economical, comfortable and safe housing.

