Low-technology dryer supplements air drying, limits defects

low-cost solar dry kiln gets trial in Sri Lanka

Horana, Sri Lanka

FOR **DEVELOPING COUNTRIES** with significant forest cover, processing logs into marketable wood products is taking on increasing importance. To avoid defects associated .with wood shrinkage, timber drying can play a critical role in that processing.

Even for domestic markets, dry kilns can be justified in developing countries.

By William Simpson and John Tschernitz Guest Contributors

They eliminate long air drying times and reduce moisture content to levels lower than can be attained with air drying.

But processors in many of these countries lack capital to build state-of-the-art commercial dry kilns. And the cost of fossil fuels to operate kilns is often prohibitive. For these reasons, solar dry kilns offer an attractive alternative.

Solar dry kilns can be built and operated quite inexpensively in labor-intensive societies, and no purchase of fuels is needed. Since many developing countries with forest resources lie in the tropics, solar energy and high ambient temperatures are available on a year-round basis.

The US Forest Products Laboratory in Madison, Wisconsin had designed and built a low-cost solar dry kiln when visited by Hope Todd, director of Borwood Ltd, a subsidiary of the Industrial Development Board of Ceylon. Mr Todd saw the prototype dryer developed for low-latitude locations and thought it would have application in Sri Lanka. Upon return to his country, he contacted the local mission of US Agency for International Development and requested support to engage the Forest Products Laboratory in helping to build a solar kiln in Sri Lanka.

Rubberwood is dried

A government enterprise, Borwood Ltd is operated as a profit-making venture. It produces a line of institutional furniture (desks, chairs, tables) used primarily by schools and the military.

One of the major reasons Borwood was established was to utilize timber from rubberwood *(Hevea braziliensis)* trees. Sri Lanka has about 240,000 ha of rubber plantations. When the trees stop producing commercial quantities of latex, after about 30 years, they are removed and new trees are planted. About 8,000 ha are harvested and replanted annually, making available approximately 16,000 m^3 of rubberwood. While this may provide a continuous supply of rubberwood, it has not been well utilized. The wood is considered to have several inferior qualities, among them a severe susceptibility to stain and insect attack when freshly cut. Borwood's trade name is derived from the boron salt preservative used in treating the green wood to reduce this problem.

Workmen install the solar collector for the solar lumber dryer built in Horana, Sri Lanka. Because the collector is separate from the drying chamber, it can be sized to supply the required energy demand.

Before this project, Borwood had only an air drying shed. Lumber was held fa about three months in an attempt to air dry from 60% down to 15% moisture content. A moisture content of between 12 and 15% is suitable for the moist Sri Lankan climate. But problems with distortion and cracking of finished furniture indicated that the moisture content of the air dried lumber was probably above15%.

The solar kiln was built in February 1981. Initial tests showed that 2.5-cm-thick rubberwood air dried to about 25% moisture content can be finish-dried in the solar kiln to 15% in less than a week. Borwood plans to operate the kiln in this manner, i.e. air dry from green moisture content of about 60% down to 25 to 30% (this should take 30 to 45 days), then finish-dry in the solar kiln to 14%. With this program, drying time can be shortened by about 50% and provide a final moisture content safely under 15%.

Kiln to be tested

The kiln as constructed has a 1.6 m^3 capacity. Since Borwood processes about 16 m^3/week of rubberwood, this kiln only provides about 10% of its needs. The kiln, however, is intended to be a prototype that will demonstrate the principles of operation.

Borwood will observe the kiln's performance and then consider scaling-up to meet its full production needs. If necessary, the kiln can be modified, substituting local materials and components for some that were imported from the us.

For more information about the solar kiln, contact William Simpson, US Forest Products Laboratory, BOX 5130, Madison, Wisconsin 53705, USA.

THE AUTHORS, William Simpson, a forest products technologist in charge of wood drying research at the US Forest Service Laboratory, and John Tschernitz, a chemical engineer also at the laboratory, were responsible for the solar dryerproject from its inception and provided technical assistance during kiln installation.