

QUARTERLY REPORT
**DEVELOPMENT OF PANEL PRODUCTS
WITH OVERLAYS AND VENEERS**

January 1, 1993 - March 31, 1993

By

Kenneth D. Roos, Research Fellow
Roy D. Adams, Associate Director

April 1993
NRRI/TR-93/13
Project No. 543255

Prepared For:
Early Stage Technology
Development Fund

Natural Resources Research Institute
University of Minnesota, Duluth
5013 Miller Trunk Highway
Duluth, Minnesota 55811

INTRODUCTION

BACKGROUND

Minnesota leads the nation in the production of oriented strandboard (OSB). These panels are generally commodity in nature and subject to wide fluctuations in market price. As part of the mission of the Natural Resources Research Institute (NRRI), to develop the State's natural resources, we have been looking at ways to add value to OSB. Wide plank flooring has historically been a premium market for high-value hardwood lumber that has remained strong for the last several decades. Although this industry is strong in the U.S., more and more homeowners and builders are finding that the cost associated with solid wood flooring is out of their budget. In addition, the solid wood resource in North America is shrinking and the competition for the resource is intense.

Companies in the U.S. and overseas have been producing a plank flooring product made by laminating a thin hardwood veneer onto plywood substrate then tongue and grooving the planks. These planks can be installed like conventional flooring using a mastic adhesive to bond the floor to the sub-flooring. Another recent development is the concept of a floating floor system. The planks are installed over a vapor barrier and 1/8-inch foam pad. Only the planks themselves are bonded together. This system minimizes the squeaking that can be associated with wood flooring.

There are a number of ways the value of commodity OSB panels can be enhanced. The addition of resin impregnated paper overlays, alone or in combination with wood veneers may be used to improve the panel properties and their suitability for new markets. These papers are generically designated as Medium Density Overlay (MDO) or High Density Overlay (HDO), depending on the level of resin put in the paper. NRRI has looked at the possibility of adding value to OSB by producing a laminated plank flooring, using MDOs and hardwood veneers.

PREVIOUS ACTIVITY/RESULTS

In a past Minnesota Technology, Inc. (MTI) project we investigated the feasibility of overlaying OSB with oak veneers to produce a fabricated plank flooring. Test results from the manufactured flooring resulted in superior properties compared to that of the OSB substrate. Two small test floors (8- x 8-ft) were installed at NRRI for extended wear evaluation, which has looked promising. Observations indicated that these floors hold up similarly to other fabricated flooring products available on the market. The only noticeable damage was from high-heeled shoes which would also damage conventional oak flooring.

In order to provide sufficient quantities of product for test marketing, a proposal was submitted to the Early Stage Technology Development Fund. We proposed to produce approximately 1,500 square feet of both oak and hard maple plank flooring for use in testing, samples, and in-service field testing. In the production of this material optimal manufacturing parameters and their associated cost would be defined. In addition, a business plan and prospectus would be developed to aid in the start-up of a new manufacturing facility or incorporation of the technology into an existing company. The proposed project was funded as is the subject of this report.

In December 1992, we overlaid approximately 90 sheets of OSB with oak and hard maple veneer using the "dry" process described in earlier reports. There was no significant problems encountered during the pressing of these sheets. At the time of submission of the last progress report to the Office of Research and Technology Transfer we were looking for a low cost manufacturer to perform the machining of the panels. This did take some time and to keep within our projected budget we had to revise the work plan slightly. This will be discussed in the next section.

Preliminary discussions were held with Mr. Ross Boerhave, Minnesota Cooperation Office, concerning commercialization of the product.

PROJECT OBJECTIVE

To manufacture sufficient quantities of fabricated hardwood plank flooring for in-service testing in residential and/or commercial settings and to develop a prospectus to aid in commercialization.

PRODUCTION OF FLOORING

MATERIALS AND METHODS

The concept of secondary manufacturing is taking low value materials and combining them with minimal production cost into a product that can compete with the higher priced item it is expected to replace. The OSB substrate used in this product is a relatively low valued sheathing panel. It was donated by Potlatch Corporation, Grand Rapids, Minnesota. The oak and maple veneer used in this product provide the look and feel of real solid wood flooring. The veneer was purchased from Louisiana-Pacific Corporation, Mellen, Wisconsin. MDOs were used in manufacturing this plank flooring to provide a built-in moisture barrier. These were donated by Dyno Overlays, Hayward, Wisconsin.

An innovative approach was used in the manufacturing of this product. The process was "dry," in that no liquid resins were used to bond the materials together. The oak and maple veneer was laid on an overlay with adhesive on both sides, on top of the 4- x 8-ft flakeboard substrate which was placed on a sheet of MDO. The combined materials were bonded in a press under heat and pressure. The target thickness coming out of the press was 5/8 inch. The panels coming out of the press were hot stacked to complete bonding.

PROGRESS/RESULTS

Lexington Manufacturing located in the Metropolitan Cities area was the low bid to perform the machining of the flooring. Their bid was approximately \$3,100 for this service which included tooling cost for cutting heads. Others bids ranged up to \$6,500. However, to receive the low bid we agreed to provide them with rough-cut planks that had been defected out and cut to length. This resulted in the NRRI taking some extra time to perform this task. This did not delay the project; but Lexington will not have the new tooling until the week of April 12, 1993, which has delayed the machining by several weeks. The planks have been delivered to Lexington Manufacturing and they will make it a priority to machine these pieces so we can meet the project deadline.

The rough planks were cut to length and ripped to width plus 1/2 inch for molding. During the cutting and ripping the defects in the planks were removed. All pieces were cut to standard sizes as follows:

Widths: 4, 5, and 6 inches
Lengths: 1.5, 2, 3, 4, 5, and 6 feet

Once the floors are machined, they will be shipped to The Valspar Corporation in High Point, NC. This is anticipated to take place during April 1993. The Valspar Corporation has agreed to perform all the sealing and finishing free of charge.

We have started the process to locate and select contractors and residential settings for the floors to be installed. An article written in the Minnesota Wood Promotion Council newsletter generated several responses. We now anticipate the floors will be installed in May 1993. We have been working on the documentation needed to install these experimental floors so as to protect the University/NRRI from liability and assure access to these floors over time for inspection and evaluation.

BUSINESS PLAN AND PROSPECTUS

Work on the business plan is progressing. We are working with the NRRI Business Group on developing a prospectus. Recent events of the lumber and panel market has made this task very interesting. Due to several factors, the prices of both hardwood lumber/veneer and panel products is increasing rapidly. These include the non-availability of the western timber and extremely wet conditions that have slowed harvest in the South. Until prices stabilize it will be hard to pinpoint an accurate production cost of these planks. Therefore, we will use prices of the raw materials used in production of the plank flooring and the competitive price at a recent given time to base our calculations and comparisons on. However, this increase in panel and wood prices has not adversely affected the competitiveness of the fabricated plank flooring since the flooring it will be competing against has risen in price similarly.

ACKNOWLEDGEMENT

The following companies are acknowledged for their in-kind contributions to the project:

The Valspar Corporation
Potlatch Corporation
Dyno Overlays