Juvenile Furniture from Alberta Pine and Aspen

H.P.C. Construction Ltd.[1]

1989

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[1]Spruce Grove, Alberta

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DISCLAIMER

The study on which this report is based was funded in part under the Canada/Alberta Forest Resource Development Agreement.

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EXECUTIVE SUMMARY

H. P. C. Construction Ltd. undertook a project consisting of Juvenile Furniture using Alberta species of wood, aspen and pine.

The line of juvenile furniture which was developed has the following components:

1. bunk beds (can be made into two single beds),
2. single bed,
3. student desk with chair,
4. shelving unit that attaches to 3 drawer dresser,
5. writing table, and
6. chest of drawers (3 or 4 drawer).

We found aspen and pine to be highly suitable for juvenile furniture manufacture. No major technical difficulties were experienced with either species.

We conclude that the manufacture of juvenile furniture in Alberta, using Alberta woods, is a viable business opportunity. Consumer reaction to the Alberta product has been exceptional. Both Alberta and export (outside of Alberta) opportunities are abundant. The proximity to the wood resource and to the market (most of the competition is in Eastern North America, or in Europe), are advantages to exploit.

While the manufacture of juvenile furniture from Alberta woods is a promising growth opportunity, there are problems impeding the development of this industry. These problems are summarizes as; 1) availability of working capital to finance production expansion and marketing efforts, 2) unstable, "fly-by-night" image problems with the large department stores, and 3) high cost of developing quality marketing brochures.

Recommendations to the Alberta government which would, in our opinion, help alleviate the identified impediments to development are:

1. Continue to think "**SMALL BUSINESS**" when developing programs for diversification and industrial development.

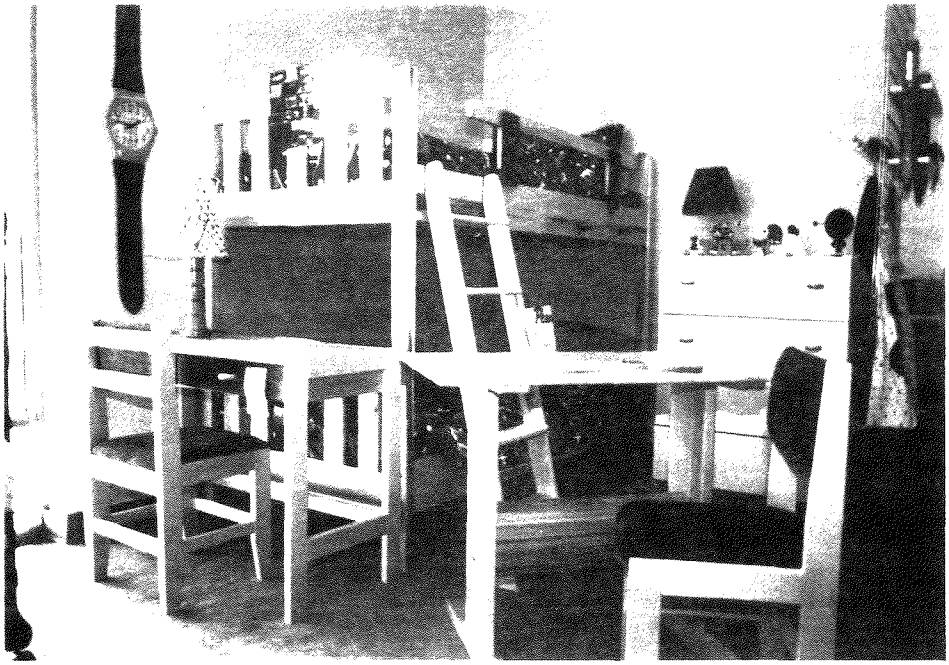
2. Assist small manufacturers financially with the development of top quality advertising material.

3. Assist small manufacturers financially with short term financing for expansion projects.

4. Use whatever political means are available to assist small manufacturers in the marketing of their products.

5. Encourage Alberta sawmillers to select high quality "clears" from the regular dimension lumber line.

6. Continue education programs targeted at the primary and secondary forest products industry in areas such as custom lumber drying, hardwood grading, etc.



Group setting of Juvenile Furniture.

TABLE OF CONTENTS

TABLES

FIGURES

TABLE OF CONTENTS

PAGE NO.

FIGURES CONT' D

TABLE OF CONTENTS

APPENDIX

INTRODUCTION

Background

The deciduous resource in Alberta is extensive and underutilized. Comprised mainly of trembling aspen (Populus tremuloides), Alberta's deciduous forest contain more than 800 million cubic meters of wood. About 30% (3.5 million cubic meters) of the sustainable, annual allowable cut (11.4 million cubic meters) is currently utilized, leaving abundant room for expansion in the primary and secondary wood industries. Alberta's coniferous forests contain more than 1.6 billion cubic meters and are composed of varying species of spruce, pine and fir. Over 70% (10.4 million cubic meters) of the coniferous annual allowable cut (14.6 million cubic meters) is currently allocated to timber companies, leaving much less room for expansion than in deciduous forests. Furthermore, most of the prime, readily accessible coniferous timber is allocated, leaving poorer, more remote stands for future development.

Alberta's forest industry currently uses the aspen resource for oriented strandboard, bleached kraft pulp, pallets and lumber. Very little secondary processing is currently performed on these aspen products. Most of these products are used in Alberta, or exported, in their primary form. Aspen lumber, for instance, is typically used in low grade applications (pallets, bins, reels, etc.) which require minimal processing. Very little aspen lumber is currently used in Alberta for furniture, or other high value-added applications. Similarly, the coniferous timber products manufactured in Alberta are mainly low value-added, primary products such as bleached kraft pulp, dimension lumber, plywood, etc. Very little of the softwood lumber produced in Alberta is processed by the secondary industry into high value-added products.

Aspen has been viewed as a "weed" species in the past (indeed, it is regarded as a weed by many in the primary forest industry). Many technical problems have been cited, with dimensional stability and excessive decay heading the list. Considerable research efforts have been undertaken by the Alberta government to solve these technical problems. Varying degrees of success have been reported, and no significant breakthroughs are evident. As a consequence of its image, very little aspen has historically been used in Alberta for high quality lumber applications.

Recently, interest in Alberta has increased in the secondary processing of aspen and coniferous lumber. Two recent studies, the "Feasibility Study for the Production of Aspen Finishing Materials" by HLA Consultants for Alberta Municipal Affairs, Innovative Housing Grants Program, April 1986, and "Custom Lumber Drying in Alberta" by Silvacom Ltd. for Alberta Forestry, Lands and Wildlife, and Economic Development, March 1987, have indicated

substantial secondary industry opportunities for aspen and coniferous lumber in Alberta. These reports indicated that the key to overcoming decay problems in aspen appears to lie with the proper selection of stands to be harvested (i.e., avoidance of over mature stands, and stands with very high incidences of decay), and the sorting of sawn lumber in to various end use categories (i.e., accept the fact that off grade material will be produced along with the higher quality furniture material, and that other uses must be sought for this poorer quality material). Utilization of proper drying technology eliminates most of the dimensional stability problems. The "Custom Lumber Drying in Alberta" study revealed that Alberta's conifers, and in particular white spruce and lodgepole pine, do not enjoy a high profile with Alberta sawmillers as potential feedstocks for a high value-added, secondary wood industry. While considerable quantities of conifers (including white spruce and lodgepole pine imported from outside of Alberta) are used in Alberta's secondary industry, few Alberta sawmillers have expressed an interest in developing the local market for high quality Alberta softwoods. Alberta's sawmillers have traditionally concentrated on the dimension lumber market-high volume production of a commodity product.

H.P.C. Construction Ltd. (The Cabinet Maker) has been manufacturing custom designed furniture and cabinets in Alberta since 1956. The current project was proposed by H.P.C. Construction in order to evaluate the suitability of Alberta aspen and pine for juvenile furniture manufacturing. Funding for the project was obtained from Alberta Economic Development and Trade, and Alberta Forestry, Lands and Wildlife. The project, recently completed, proves the viability and desirability of Alberta woods for high quality, production line furniture.

Objectives

The objectives of this study can be classified as:

Part 1 Determine the optional methods for drying, machining, fastening, gluing and finishing aspen for use in furniture making.

Part 2 Design, construct and market a complete line of solid wood juvenile furniture made completely from Alberta woods (aspen and pine).

This report outlines the results of this project. Following this discussion are sections covering technical characteristics of Alberta woods, market reaction, benefits to the Province of Alberta, impediments to development, and recommendations and conclusions.

ALBERTA WOODS FOR USE IN FURNITURE MANUFACTURE

Table 1 presents a summary of our findings regarding the technical characteristics of two Alberta woods, trembling aspen and lodgepole pine. Particular emphasis is placed on the suitability of these indigenous Alberta woods for juvenile furniture manufacture.

In summary, we found both species to be highly suitable for juvenile furniture manufacture. Aspen in particular has very good visual appeal, with an almost white, and very "clean", appearance. Furthermore, aspen exhibits favorable splintering characteristics - it does not splinter readily, and when it does splinter only long dull pieces are formed. This is a favorable safety feature for juvenile furniture. No major technical difficulties were experienced with any of the species tested.

TABLE 1 - TECHNICAL CHARACTERISTICS OF ALBERTA WOODS

	ASPEN	PINE
DRYING	Six months to dry 46% MC to 6%. Indoor, air drying 6% downfall. Some end checks. No serious problems.	4 months to dry 23% to 6% MC. Forced air drying virtually no degrade. No serious problems.
MACHINING	Very sharp knives are required for planing and cutting. Dull knives result in "fuzzy" edges. When cross-cutting, ordinary steel saw blade better than carbide tipped. No serious problems.	Excellent, no problems.
FASTENING	Very good for stapling. Can staple right at ends of boards. Good screw holding.	Not as good as aspen with staple gun, must be careful not to come too close to board ends. Poor screw holding in ends of boards.
GLUING	Excellent gluing properties. Weldwood "Presto Set" or LePages "Sure Grip" gave equal performance. No staining problems.	Satisfactory gluing except for pitchy pine which should not be used in glue joint applications. Same glues used as with aspen.

(Table 1) (Cont'd)	ASPEN	PINE
SANDING	New belts required, must have SHARP belt to prevent fuzzy finish. No major difficulties.	Used belts are best. Dull belt gives smoothest finish.
FINISHING	Both hot and cold spray lacquer tested and performed well. Sealer coat (thinned) is required before application of two top coats.	Tow coats of spray lacquer are fine. Both clear lacquer and paint lacquer are fine. Hot and cold lacquer tested fine, but hot is quicker to apply.

BUYING SPECIFICATIONS

Our Alberta lumber has been purchased from a variety of sources, but usually comes direct from the sawmill. Our preferred buying specifications for furniture grade Alberta lumber are:

- rough, 4/4 and 6/4 x r/w (4", 6", 8") x r/l (12' preferred),
- preferably custom dried to 6% MC, else, dried to 19% for further drying at furniture shop,
- small quantity purchases (generally less than 15,000 bd. ft. per purchase),
- high quality, lumber grading according to hardwood rules is currently not practiced by Alberta sawmillers, we have developed satisfactory grade rules in conjunction with local sawmillers who have agreed to pull out "selects" from the standard dimension line, aspen and pine is desired with few knots, and no stain. In our experience, 25% of this "clear" grade typically will have excessive knots and stain. A paint grade version of our standard product line was developed to utilize this material.

DRYING AND STORAGE

Preferably, wood is purchased kiln dried to 6% MC. More often, however, we have taken delivery of our lumber when it has only been pre-dried (static air drying) to dimension lumber standards (19% MC). Often our lumber arrives with moisture content of 25% and more, and we use an "enhanced" air drying system to bring the moisture content down to 6%. Small sawmillers have been the most cooperative in pulling out selected grades of lumber. These operators typically do not have kiln drying facilities, or well controlled air drying areas. Custom kiln facilities in the province are rare, therefore, the furniture maker must be prepared to take the responsibility of properly drying the lumber feedstock to furniture standards.

We have successfully used a system of air drying to properly condition Alberta aspen and pine. Figures 1 through 2 show the area in our shop which houses the drying lumber. Figure 2 shows the lumber being dried with the assistance of a conventional house fan. Using this "enhanced" system of air drying, we have successfully dried pine from 23% to 6% in four months and three months respectively. Virtually no degrade has resulted from this procedure. Aspen has been similarly dried (before we started using the fan for air circulation) from 45% MC to 6% MC in about 6 months. Some minor end checking resulted with the pine and aspen, but no serious degrade was encountered.

Our experiences with aspen indicate that the air dried wood was easier to finish than kiln dried wood. The kiln dried aspen (dried using a dehumidification kiln) showed a greater tendency to "fuzz" when sanding - obtaining a sufficiently smooth surface was more difficult than with the air dried aspen. We are not sure whether this is a reflection of the drying methods used, or whether some other factor, such as wood origin, is the cause. Aspen and pine must be stored in a dry, level spot, and should be kept indoors. At all times, moisture content must not exceed 6%.

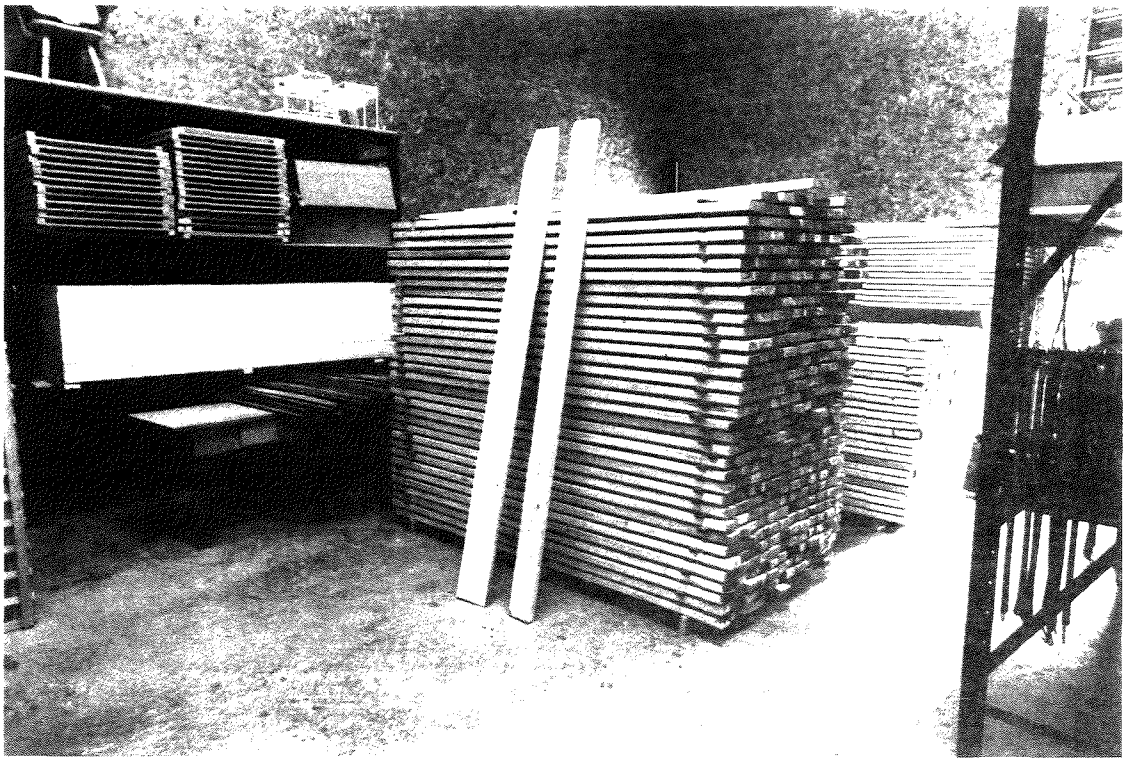


FIGURE 1a - Lumber drying area.

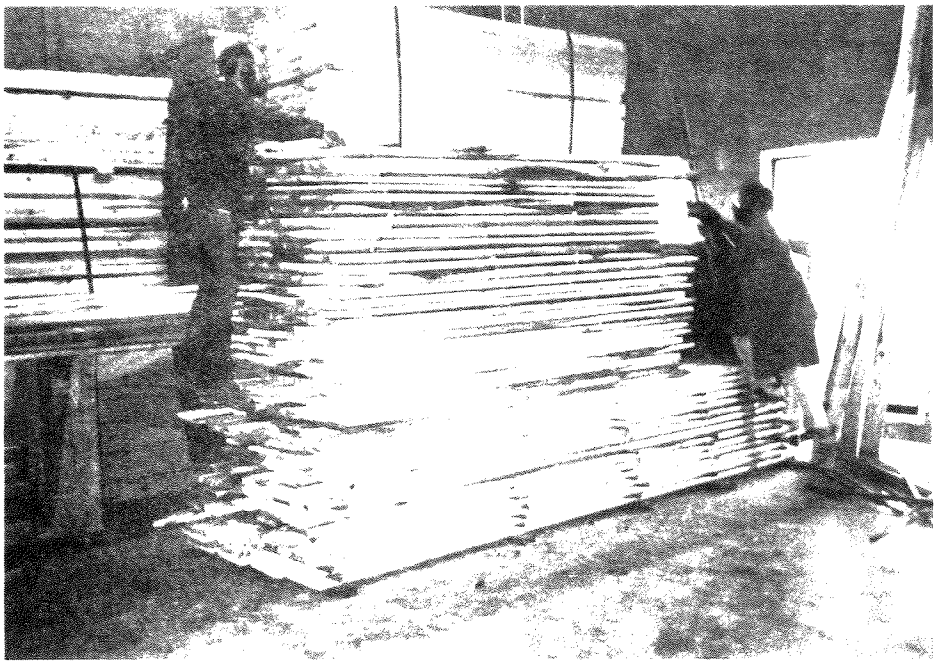


FIGURE 1b - Aspen being stacked for drying.

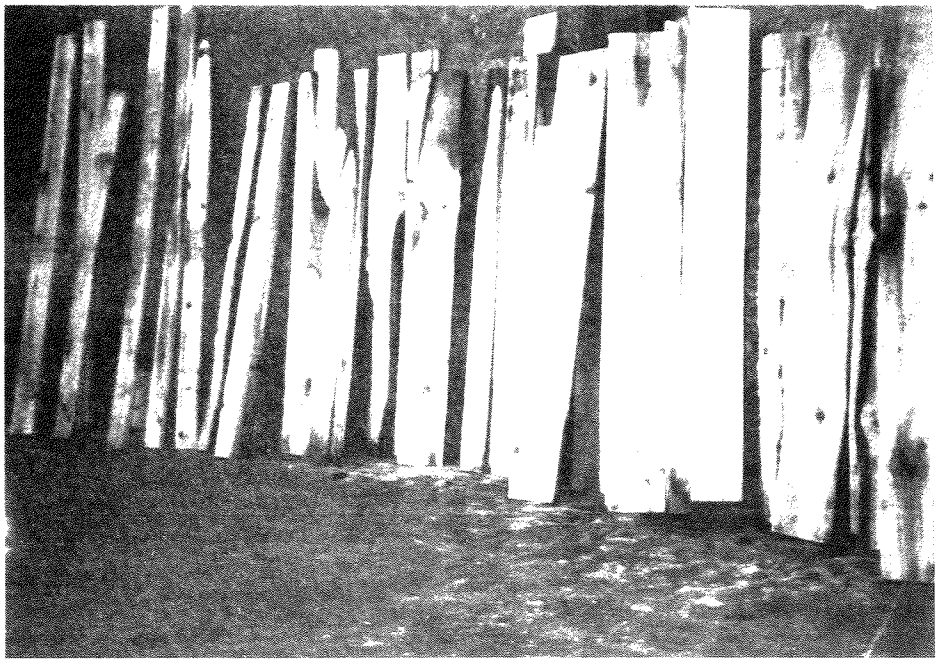


FIGURE 1c - This is now selected aspen.

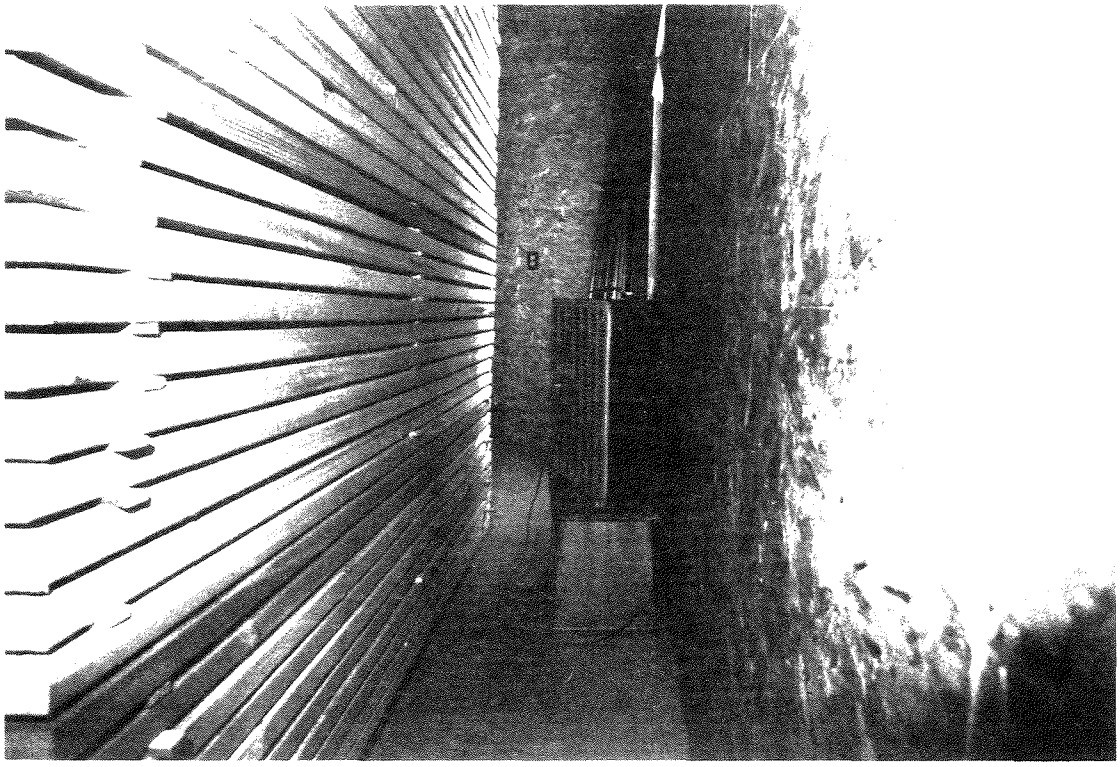


FIGURE 2 - Fan assisted air drying.

MACHINING

In general both wood species machined well. Pine required no special attention - normal furniture making equipment handled these woods with no problems.

Aspen required some special treatment. Very sharp knives and blades are required for planing and cutting aspen. Dull knives and blades result in "fuzzy" edges. When cross-cutting aspen, an ordinary steel blade gave better performance than carbide tipped blades. When planing aspen, we recommend that the board first be straightened using a jointer before it is planed on a thickness planer. Aspen will plane smoothly and clearly without chipping. All machining problems with aspen were of a relatively minor nature, and were easily handled by following these guidelines.

Figures 3 through 4 show typical saws used in our manufacturing process. The automated feed saw (Figure 3) is used to cut most components.

We purchased a 35 head, horizontal and vertical, doweling drill specifically for our baby cribs. Now it also can be used for drilling the components for our juvenile line. This equipment is displayed in FiGures 5 and 6. Without equipment of this nature, it is impossible to accurately, and economically, drill these multiple dowel holes.

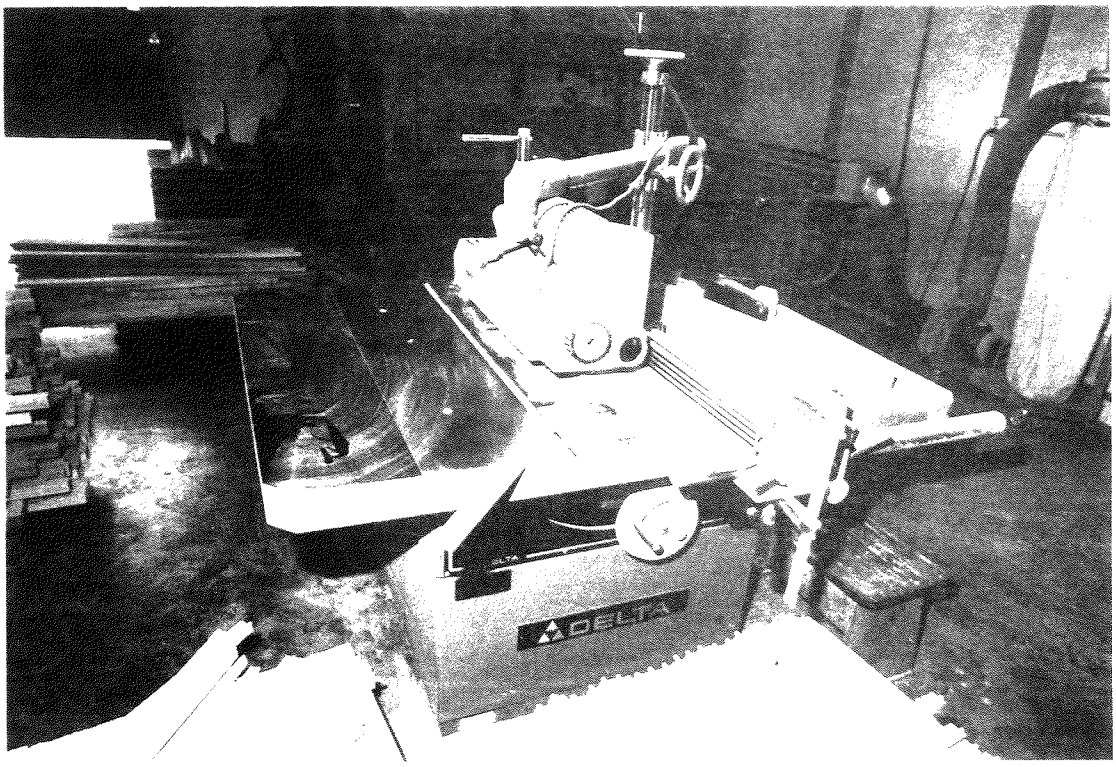


FIGURE 3 - Automated feed saw.

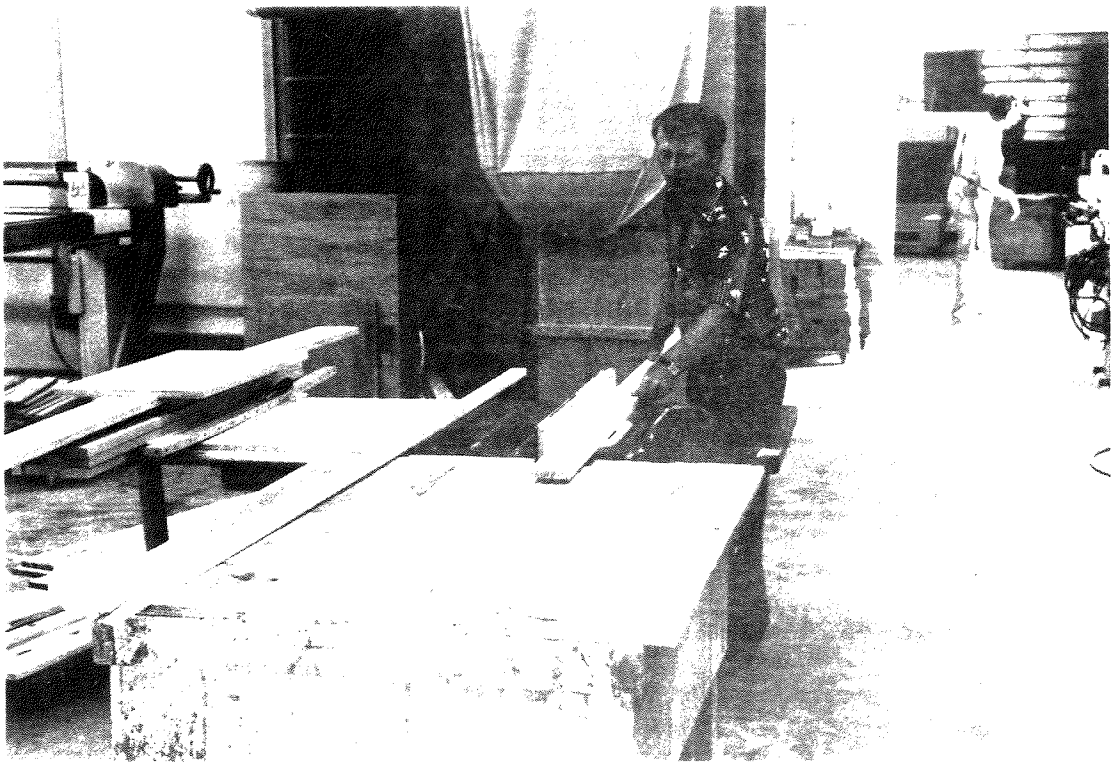


FIGURE 4a - Manual feed saw.

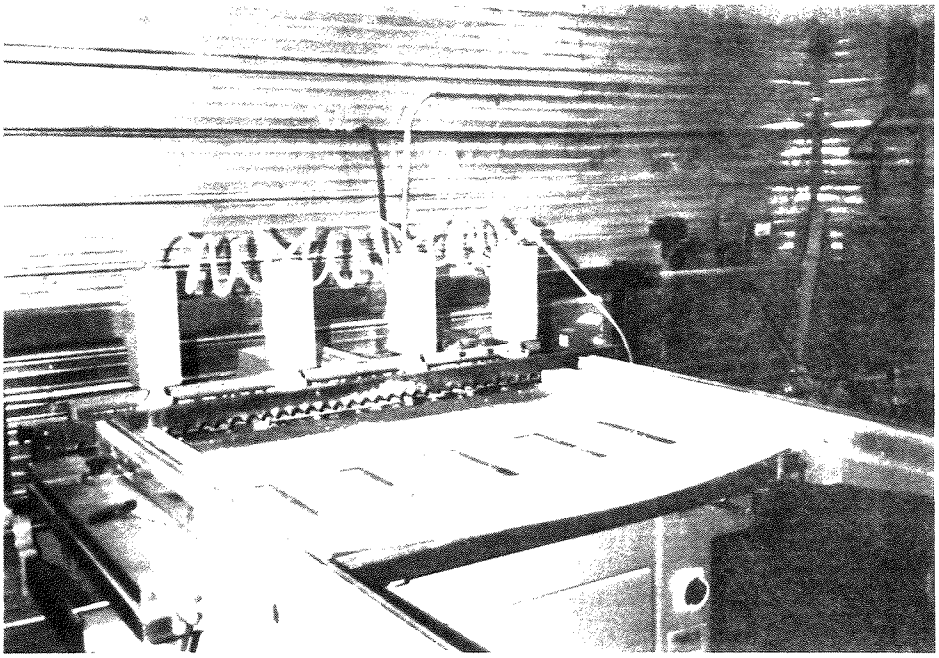


FIGURE 4b - Multi-head doweling drill, front view.

FIGURE 5 - Planning aspen.

SANDING

Pine sands readily, leaving a high quality finish. Our experience has shown that using dull sanding belts gives the smoothest finish in pine.

Aspen will also have a high quality finish, if the following steps are followed:

- No wood filling is necessary.
- For a good quality finish, sand well with #220 paper. We have used 3M paper with success.
- For the best quality finish, sand well with #220 paper. Then dampen the wood lightly with water using a brush or damp cloth. Within two hours, the wood will dry. Sand again with #220 paper.
- We have found air dried aspen to sand easier than kiln dried aspen. We do not know whether this is in fact a result of the drying method, or some other unidentified feature of the kiln dried wood. The kiln dried aspen appeared to "roll" under the sanding block. We recommend that the sanding dust be removed with a hand brush between sandings.

Figures 6 (edge sander) and 7 (stroke sander) illustrate the two types of sanders used in our operations.

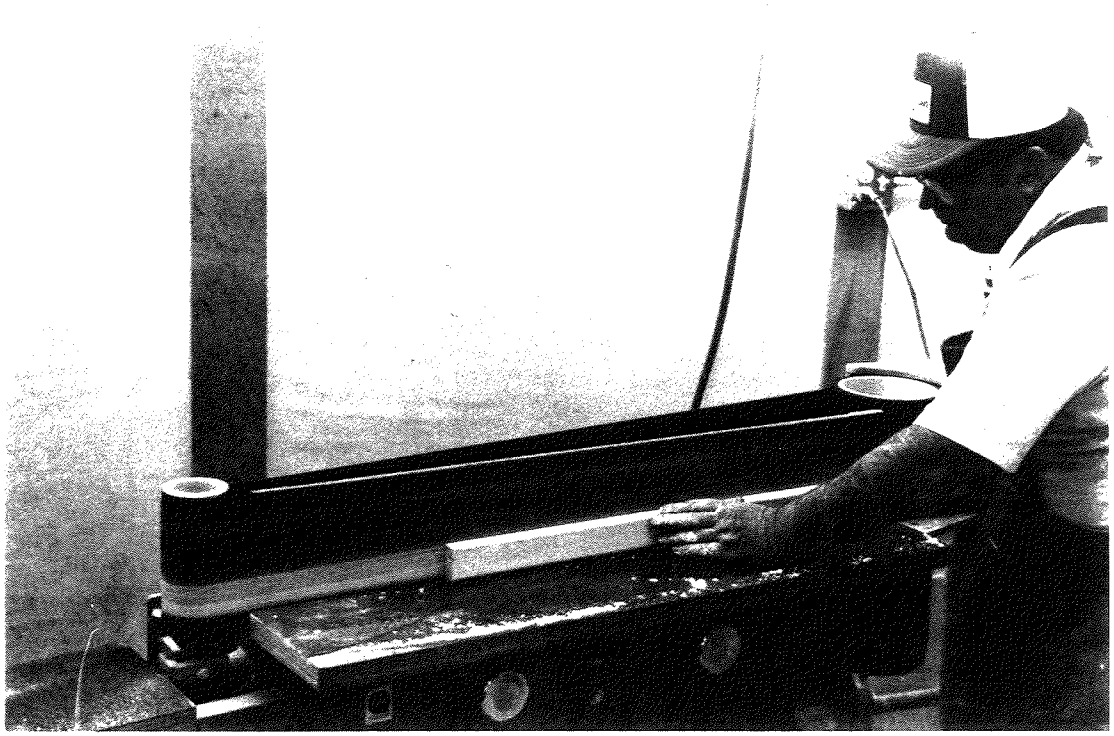


FIGURE 6 - Edge sander.

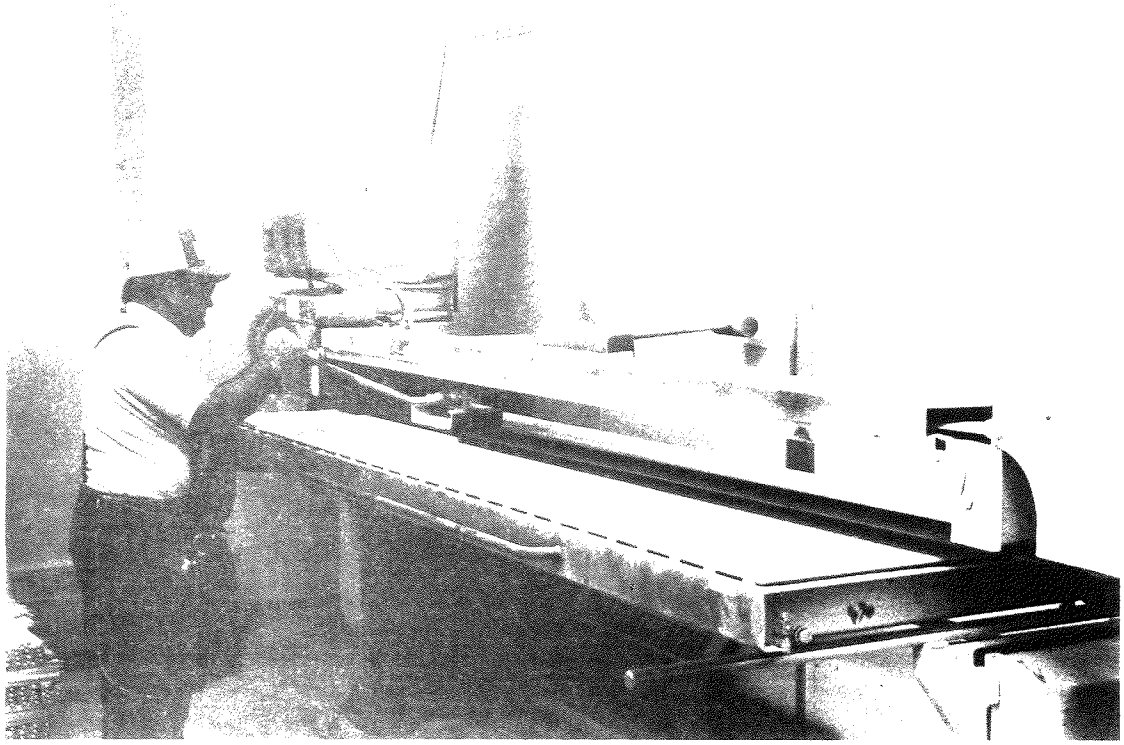


FIGURE 7 - Stroke sander.

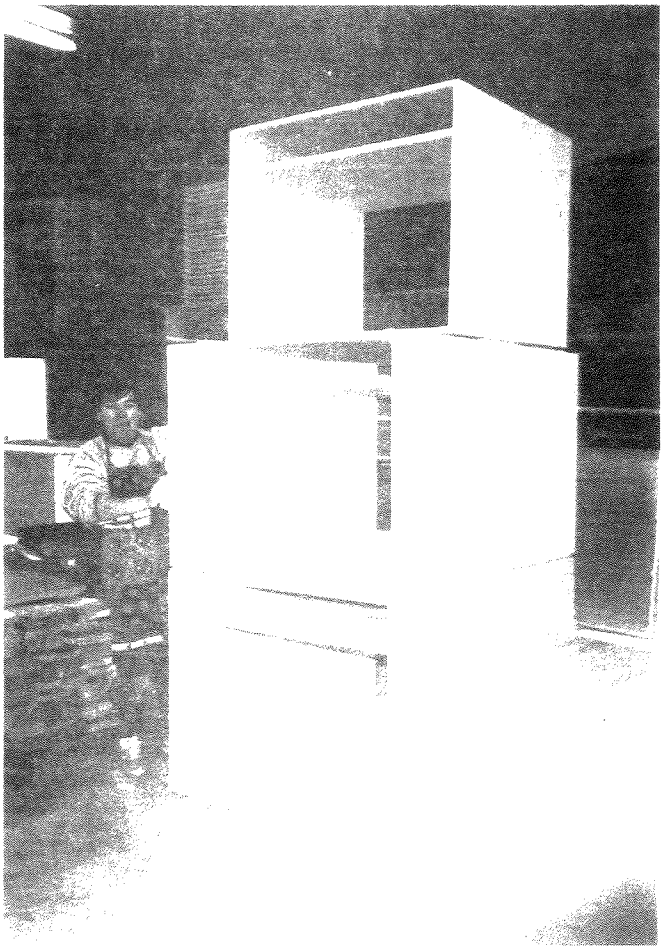


FIGURE 8 - Sanding off the sealer before finishing.

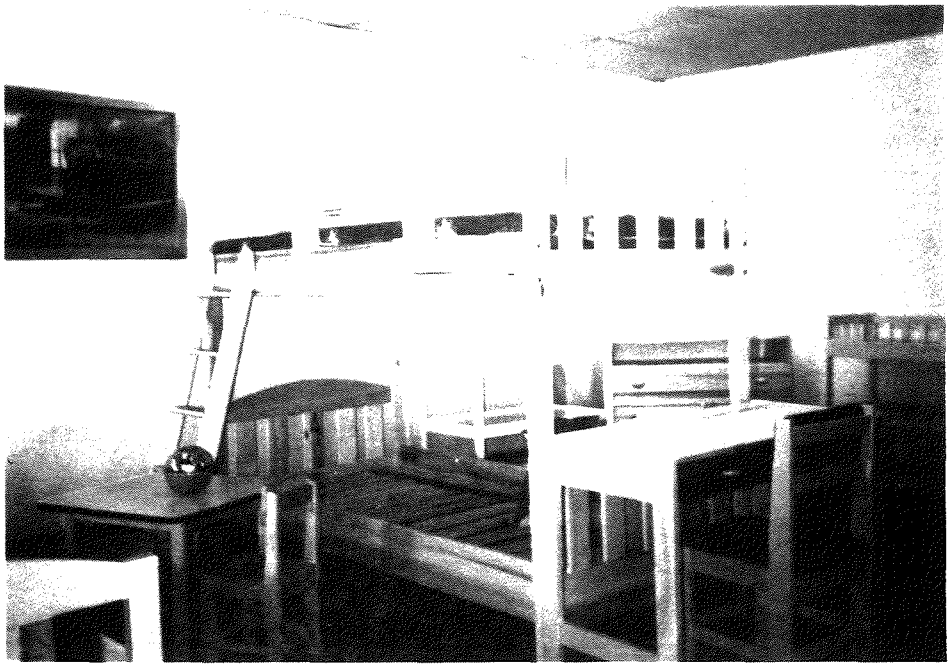


FIGURE 9 - Prototype bunk bed.

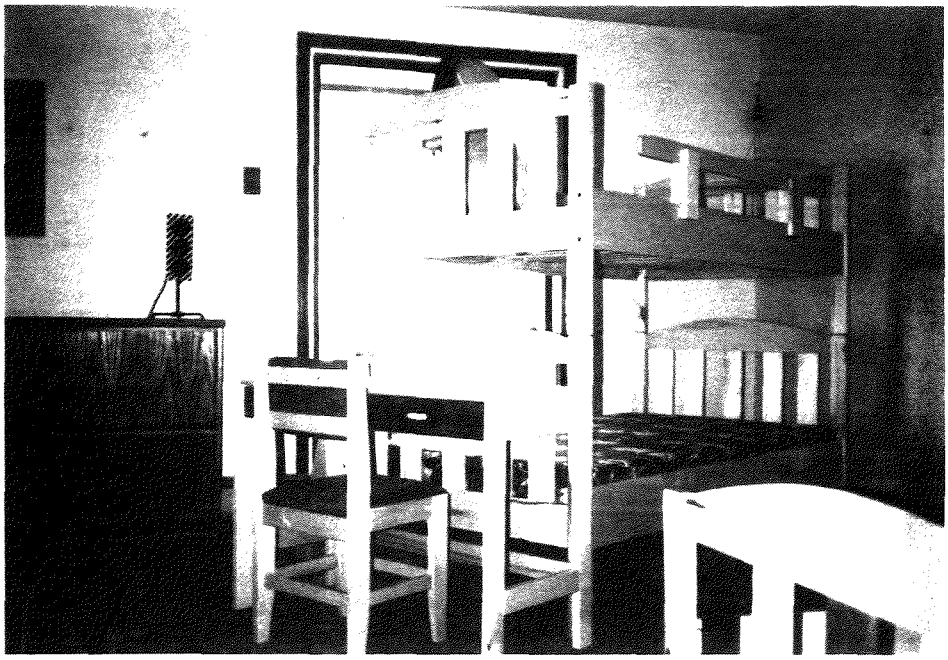


FIGURE 10 - Finished bunk bed - able to make into two single beds.

GLUING

Aspen exhibits excellent gluing properties. Pine also exhibited good gluing ability except for pitchy pine, which should never be used in glue joint applications.

Glues from two manufacturers were used with equal results:
- Weldwood Presto Set White Glue, and
- LePages Sure Grip (Cabinet Maker Quality) Glue.

We tested these glues with aspen and pine by gluing two pieces of wood together, then sanding, staining and varnishing (or leave natural). We found no wood discoloration at the joints.

Figures 9 and 10 illustrate prototype and finished product of the bunk bed. Figure 11 illustrates a glue distribution device developed at H.P.C. Construction. Made out of copper, with several holes drilled in its sides, this device forces glue into all areas of a dowel hole, creating maximum glue contact between the two pieces of wood.

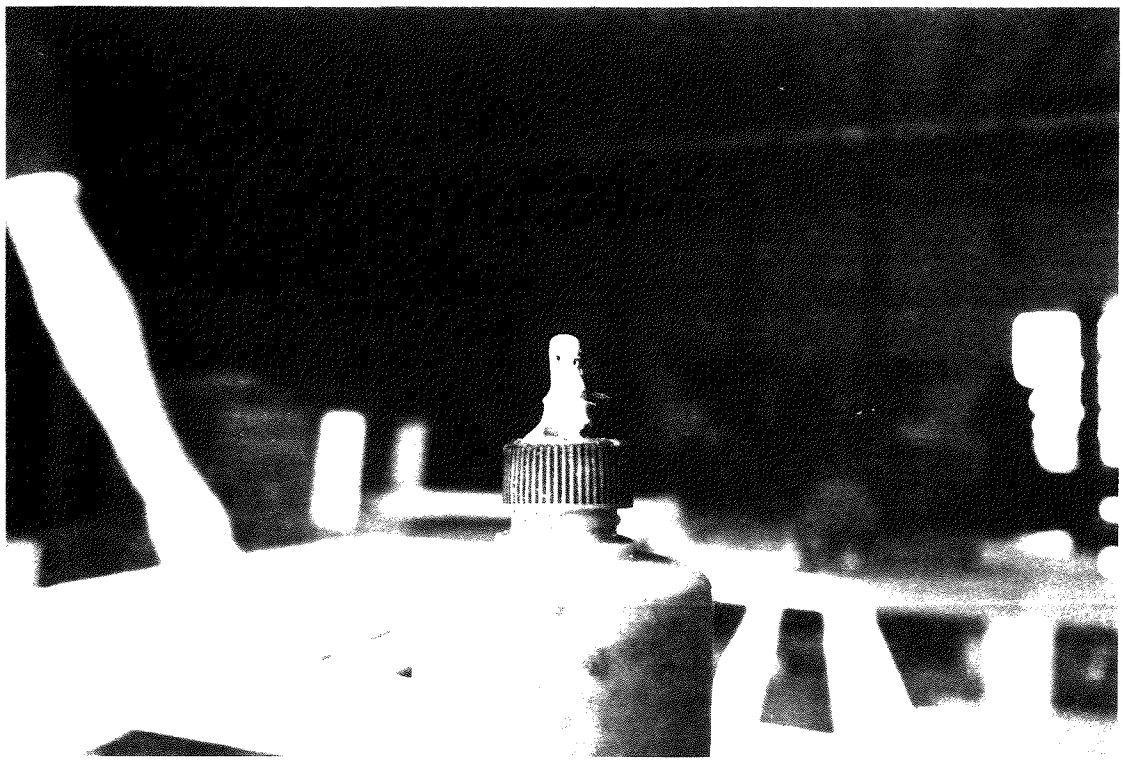


FIGURE 11 - Glue distribution device.

FASTENING

Of the two species tested, aspen exhibited the best fastening properties when using staples and nails. Aspen can be nailed or stapled as close as 2 to 6 mm from the edge or end of the piece without splitting the wood. When stapling very close to the edge, apply the staple at a 45° angle to minimize wood splitting. Aspen also proved to be an excellent material for glass moldings because small nails (#18 x 12 - 15 mm) can be used with no splitting in the wood.

Pine can be nailed or stapled as close as 6 to 9 mm from the edge or end of the piece without splitting the wood. Pine is the poorest of the two species for stapling and nailing. It splits the easiest and exhibits poor screw holding properties in the end of the boards. The recommended staples for both species of wood are 12 mm - 25 mm air gun staples.

When screwing, always pre-drill to the size of screw that is used. Screws can be used in these species as close as 6 mm from the edge or end of the piece. Aspen exhibits the best screw holding properties.

FINISHING

Once the wood is properly sanded, it can be stained and/or lacquered. We recommend using an alcohol or wiping stain for best results. Pine requires two coats of lacquer. Both cold and hot lacquer systems were tested with equal results. Hot lacquer is much quicker to apply and has been adopted into our production line.

Aspen requires a sealer coat of "lacquer sanding sealer", a light sanding and then two finishing coats of regular lacquer.

Figure 12 illustrates H.P.C. Construction's spray room with bunk bed components being finished. Note the bank of filters in Figure 12. An extensive fan system behind these filters is used to ventilate the room.

While all of our wood is purchased as a so-called "clear" grade, considerable defect is evident in the wood supply. We estimate that approximately 25% of the clear material purchased has too many knots or excessive stain, and cannot be used in exposed wood applications. Some of this material is cut into strips for bonding to melamine panels used in our infant line of furniture. Most of this material, however, goes into our "paint grade" line of juvenile furniture and infant furniture. Realizing that many

consumers prefer a painted surface, and wanting to offer more variety in our product line, we developed a white lacquer finished product which uses all of the paint grade material we generate. Knots are drilled, doweled and sanded smooth.

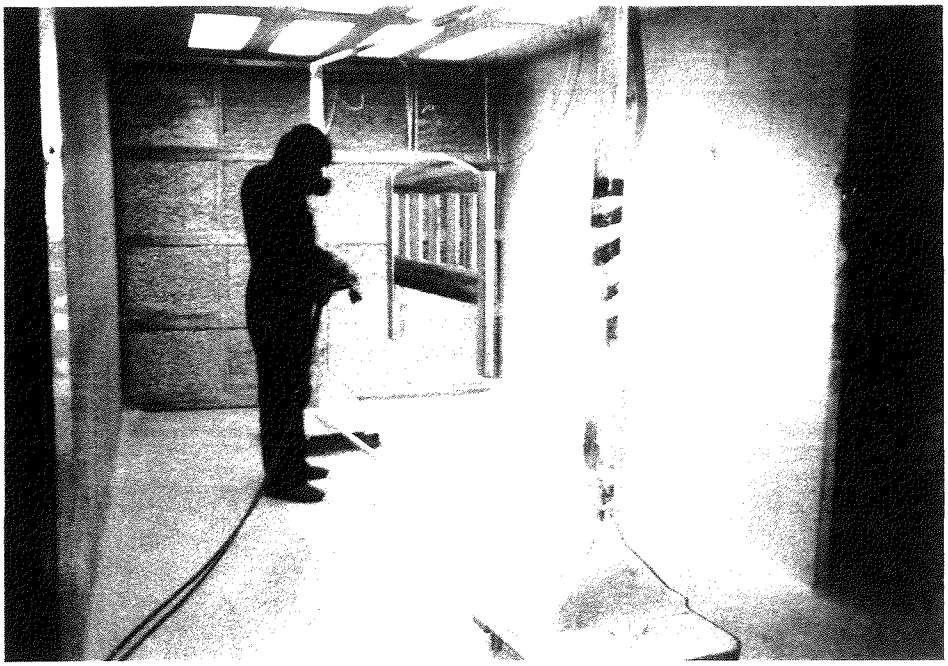


FIGURE 12 - Spraying bunk bed components.

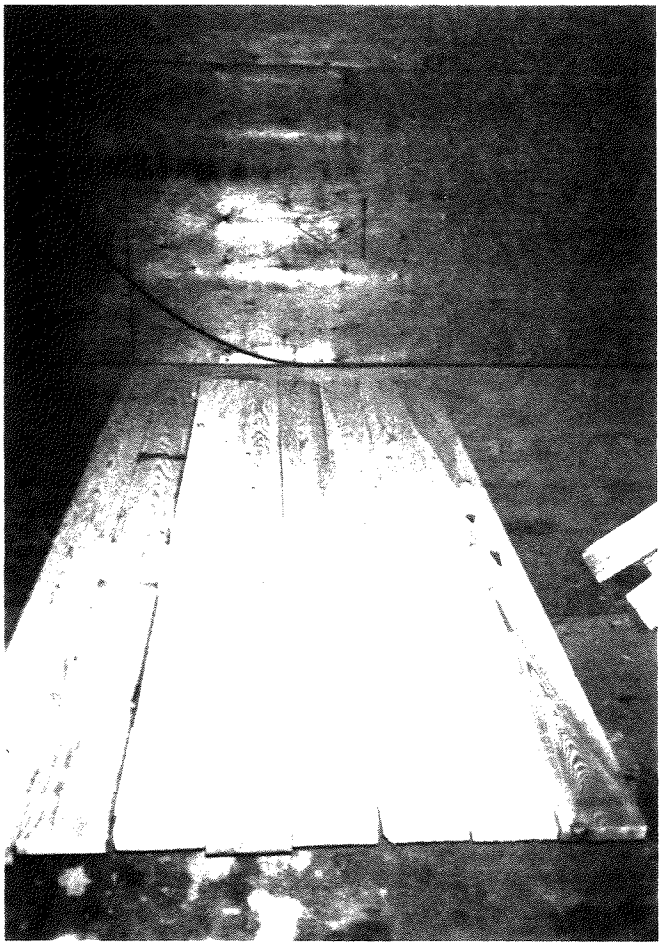


FIGURE 13 - Clear pine being prepared for stacking and drying.

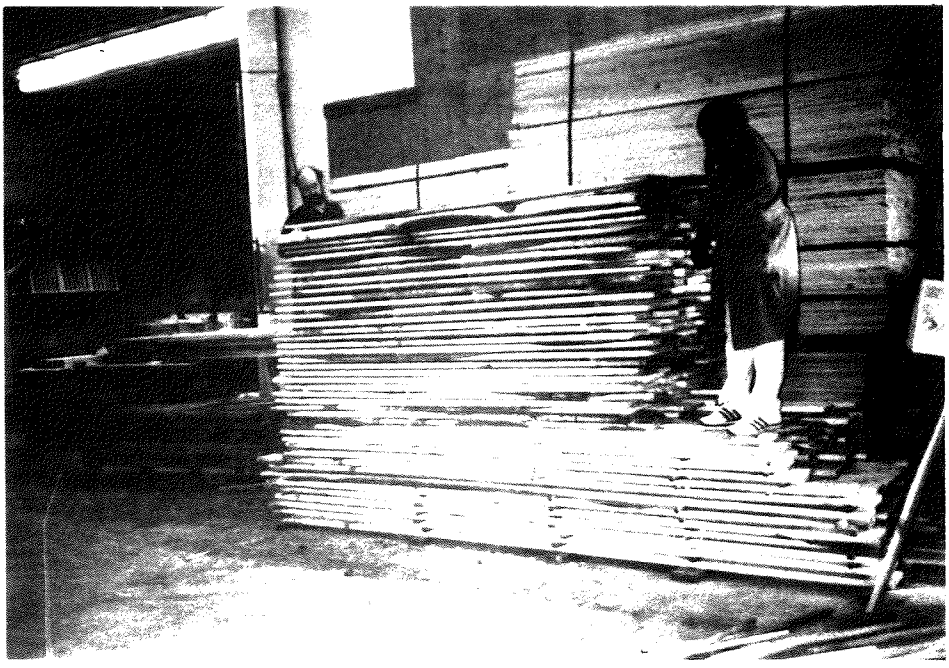


FIGURE 14 - Non-selected aspen stacked for drying.

PACKAGING

Considerable effort was devoted to the development of a functional, efficient and attractive packaging system. Our line of juvenile furniture is designed to be shipped knocked down (bunk bed and single bed). A box or cardboard wrapping was designed for all the components to be packaged efficiently and protects the furniture from damage.

Figures 15 and 16 show an overview of our packaging area.

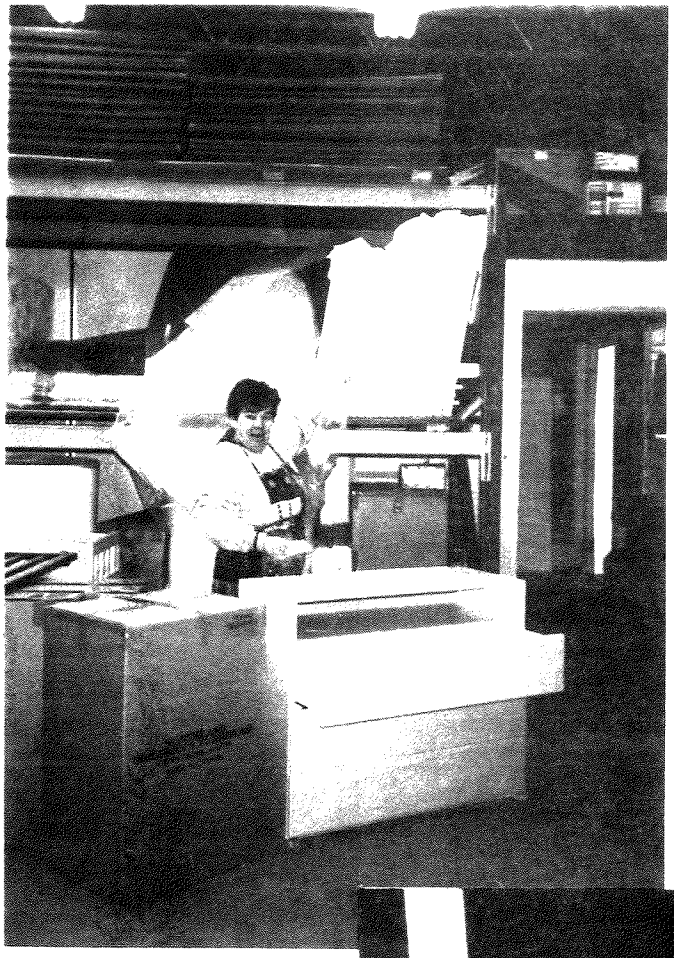


FIGURE 15

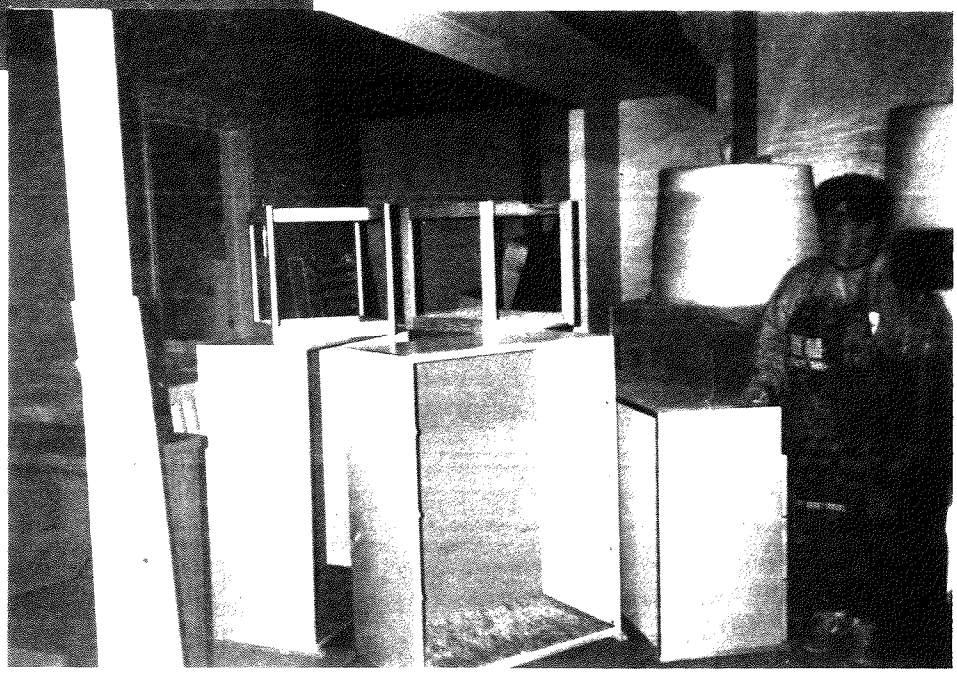


FIGURE 16

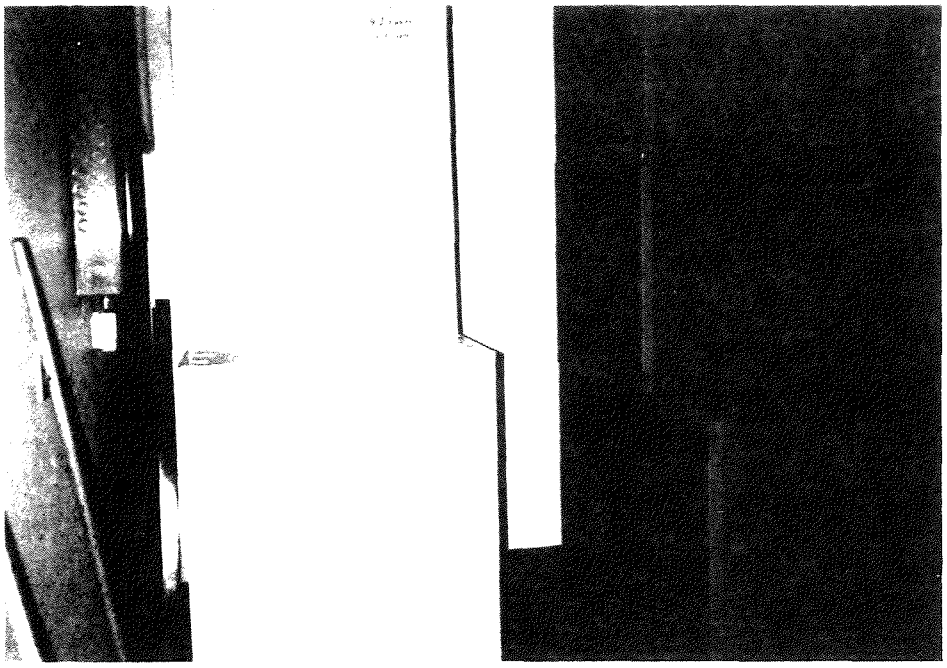


FIGURE 17 - Part of storage area.

MARKET REACTION

Market reaction to the H. P. C. line of juvenile furniture has been exceptional. We describe the marketing aspects of this project in three sections:

1. Marketing Efforts,
2. Marketing Results, and
3. Marketing Problems.

1. Marketing Efforts

The H. P. C. line of juvenile furniture has been promoted under the name "Northland Children's Furniture". Marketing efforts have been concentrated on trade shows and direct sales calls to specialty children's stores. Also, we have replaced our old brochure with a new version incorporating the juvenile furniture into it.

H. P. C. Construction displayed the Northland Children's Furniture line in the late summer and fall at the JPMA show in Dallas, Texas, and the San Francisco Contemporary. Response was excellent and concrete contacts were established in San Francisco.

We have a full time sales representative promoting Northland Children's Furniture line in Canada and the Pacific West. This representative has been making marketing efforts throughout Western Canada, concentrating on specialty children's stores. So far, successful distribution has been forged with The Children's Shoppe in Calgary, also with T.J.'s Kiddies Corner in Vancouver, New Arrivals in Grand Prairie and a few other small shops.

Marketing efforts in the U.S. have concentrated on regions within close proximity to Alberta, primarily the Pacific-Northwest region. Our own sales representative does direct sales calls to children's specialty shops, as well as department stores, in the marketing of the Northland Children's Furniture line.

2. Marketing Results

Initial market reaction to the Northland Children's Furniture line of furniture has been exceptional. Our baby crib is the anchor of the Northland Children's Furniture line. The new line added to the furniture has a lower sales level, which is expected, but contributes significantly to the overall line.

Most sales to date have come from the U.S. children's specialty shops. We had discontinued selling directly from the H.P.C. Construction plant site for awhile to let distributors sell from Edmonton retail stores but found that no one was willing to carry stock and acquired merchandise a couple of pieces at a time. So we decided to continue selling retail from our own plant store and we sell quite a sufficient amount of furniture.

3. Marketing Problems

The main marketing problem encountered by H.P.C. Construction in the promotion of the Northland Children's Furniture line has been the inability to sell to the large department stores. In particular, we have devoted significant promotional efforts on Woodwards stores. This chain is Western Canada's high quality furniture department - ideal for our line of high quality, solid wood furniture. While some managers with Woodwards appeared favorably inclined to go with our product, the decision makers tested the line in the West Edmonton Mall store. They decided not to continue even though the sales were looking good. We believe they still think of us as a "fly by night" operation. The penetration of other large, high quality stores will likely come over time, as the Northland Children's Furniture line becomes better established in the specialty shops.

the Alberta government could assist the development of the furniture industry in the province by; 1) encouraging the selection of high quality "clears" from standard dimension lumber mills, 2) continuing to educate the primary and secondary industry regarding topics such as custom lumber drying, hardwood grading, etc., and 3) assisting the secondary industry in marketing and capital expansion.

APPENDIX I

Northland Furniture Pamphlet

Northland Furniture Pamphlet handed out at retail outlets.