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report on
canadian
sash, door,
and millwork
manufacturers
technical mission
to europe

march 3-17, 1973

REPORT ON
CANADIAN SASH, DOOR AND MILLWORK
MANUFACTURERS TECHNICAL MISSION
TO EUROPE
MARCH 3 - 17, 1973

Manufactured Wood Products Division
Resource Industries and [Construction Branch]
(Canada) Department of Industry, Trade and Commerce
Ottawa, Canada

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INTRODUCTION

The Resource Industries and Construction Branch of the Department of Industry, Trade and Commerce, in co-operation with the Architectural Woodwork Manufacturers Association of Canada and the Canadian Window and Door Manufacturers Association, sponsored the Canadian Sash, Door and Millwork Manufacturers Technical Mission to Europe to investigate advanced manufacturing techniques in Italy, West Germany, France and Britain. This report summarizes the mission's findings.

PURPOSE OF THE MISSION

The purpose of the mission was to study advanced manufacturing techniques, raw material utilization, product innovation, product design, marketing methods and other relevant information which could be used to advantage by the Canadian sash, door and millwork manufacturing industry to improve its efficiency and productivity.

MISSION ITINERARY

The mission members assembled in Montreal on March 3, 1973, and flew to Milan, Italy, where they toured three window and door plants in Northern Italy.

On March 7 the members travelled to Hamburg where they toured two window and door plants and visited the permanent exhibition of building components and building materials at the Bauzentrum.

Arriving in Paris March 10, the mission visited three custom millwork manufacturers and two window and door manufacturers. Mission members were invited by the French Ministry of Construction to a private tour of the apartments being renovated in the Chateau de Fontainbleau and the Chateau de Versailles. On March 14, the members attended a meeting with senior officers of the Centre Technique du Bois.

The mission arrived in Britain on March 14 and visited four architectural millwork, door and window plants and met with senior officers of the British Woodwork Manufacturers Association.

The mission returned to Canada on March 17, 1973.

A detailed list of companies, plants and associations visited is included in Appendix "A".

MEMBERS OF MISSION

The Canadian Sash, Door and Millwork Manufacturers Technical Mission to Europe was composed of 10 senior executives from the industry and two representatives of the Department of Industry, Trade and Commerce as follows:

Major Product Interest

Philippe Dupuis Export Manager Premium Forest Products Limited 426 Ellesmere Road Scarborough, Ontario Tel:(416) 291-7321 272 de Chateauguay Longueuil, Quebec Tel:(514) 679-4112	doors
M. P. Leduc Vice-President J. Albert Leduc Ltd. 57 Ogilvie Street Valleyfield, Quebec Tel:(514) 373-6861	custom architectural millwork
L. H. Lockhart President Lock-wood Ltd. P.O. Box 30 Scoudouc, New Brunswick Tel:(506) 532-4463	windows
C. P. Loewen President Loewen Millwork Ltd. P.O. Box 2260 Steinbach, Manitoba President Canadian Window and Door Manufacturers Association Tel:(204) 326-6446	windows
D. H. G. Macgregor Vice-President Tru-Fit Millwork 5776 Beresford Street Burnaby 1, British Columbia Tel:(604) 434-2441	doors

Major Product Interest

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windows

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SUMMARY

1. Lumber represents the major raw material utilized in the European sash, door and millwork industry.
2. Availability of skilled labour is a critical problem in the European industry. To alleviate this situation manufacturers are hiring a greater proportion of female and immigrant workers.
3. European plants use a high level of modern production and material handling equipment.
4. Finished products are wrapped in polyvinyl sheets and sealed to protect them from the elements and pilferage.
5. Quality control is of the highest importance and rigid product standards enforced throughout the industry are evident at all stages of the production process.
6. Some manufacturers are carrying out research and development on plastic windows. To date, this product is still in the experimental stage and plastic windows are not yet a significant factor in the European market.
7. The European sash, door and millwork manufacturers are well organized to meet the requirements of a buoyant market. They are supplying a quality product package that integrates, at the manufacturing level, processes performed largely as separate functions in Canada. In Europe, many manufacturers not only produce millwork but also carry out prefinishing, hardware installation and on-site application of the various products. This has a significant multiplier effect on sales volume or turnover. The continental manufacturers have developed this package concept to a high degree.
8. Industry trade associations are most active at the national and international level. Their activities are aimed at improving the efficiency and productivity of the industry and service of the associations to member firms and customers.
9. Design is an important factor in the production and marketing of sash, door and millwork products specified by architects.

CONCLUSIONS AND RECOMMENDATIONS

The members are indeed grateful for the invitation to participate in this mission and wish to express their appreciation for the excellent arrangements made by officers of the Department of Industry, Trade and Commerce in Canada and the trade posts abroad. It was a most interesting tour. Such informative visits should be repeated at regular intervals, having in mind the continuing technical developments facing this industry and the need to adapt to these changes if Canadian manufacturers are to remain competitive.

It is suggested, however, that consideration be given to reducing the number of visits on such a mission in the future, while preserving the time available for the mission. This would, it is hoped, enable a study to be made in greater detail at each facility thus providing an opportunity for an in-depth comparison with Canadian operations. This is particularly true of the many facets of business that must be considered over and above the physical manufacturing processes.

It is recommended that:

- 1) The feasibility of forming one national organization to represent the sash, door and millwork manufacturers of Canada be assessed. Such an organization to be modelled, insofar as the scope of membership available will permit, after the British Woodwork Manufacturers Association.
- 2) The expert guidance and knowledge present within the Department of Industry, Trade and Commerce be freely available on a continuing basis to the proposed association so that a real emphasis can be developed to up-grade the "state of the art" in the manufacture of wood products and use of wood in Canada.
- 3) The sash, door and millwork manufacturing industry consider progression to the complete product package and thus secure the multiplier effect on sales. This could be carried out through integrating the present separate functions of sash, door and millwork assembly, pre-hanging, pre-finishing and installation. It is further recommended that appropriate marketing strategies be developed to achieve this objective.
- 4) The use of pre-finished, pre-hung interior doors should be promoted. This is a much more economical method of supplying a finished product to the user and the quality of the finish far exceeds what is now available using on-site labour.
- 5) Canadian secondary manufacturing wood industry should consider the up-grading of its operations to improve the use of lumber to match European levels.

- 6) The Canadian sash, door and millwork industries should seek to improve product design in order to increase the level of sophistication, durability and overall performance of their products.
- 7) The Canadian sash, door and millwork industries would benefit greatly by utilizing the innovative capabilities of professional industrial designers.

GENERAL COMMENTS AND OBSERVATIONS

Italian Plants

Without exception, the Italian door plants produce a high quality product that is sold as a complete package, comprising a prefinished door, pre-hung in pre-finished jambs with all hardware installed.

Materials used for framing in doors include Douglas Fir, Hemlock, Baltic Redwood and African Mahogany lumber. Core material is kraft paper honeycomb -- a cellular construction (upon expansion within the frame) made from kraft liner -- while the door skins are hardboard with mahogany veneer lamination. The design of the door involves the use of a rabbeted hardwood stile edge-bonded to a softwood inner stile and lapping over the jamb sections.

The doors and frames are machined for hardware before being prefinished. The finish, urethane varnish or paint, is applied by a curtain coater on the doors and the frames are sprayed. The door is hung in the frame and then packaged for shipment to the job site. The manufacturer also produces a sub-frame that is sent to the job site to be built into the wall openings so that when the finished frame and door is installed there are no problems. The manufacturer is responsible for installing the door and frame on the job.

Manufacturing operations in the plants visited are integrated with a measure of in-plant lumber production as a source of certain raw materials, usually mahogany lumber. Kiln drying facilities are essentially similar to Canadian installations although one plant (SIS) has an installation using a vacuum kiln process. The kiln chambers are small and this type of kiln has little to recommend it to any large Canadian manufacturer concerned with drying significant volumes of domestic lumber, but it has a possible application for smaller volumes of the imported materials such as mahogany.

The major manufacturing plants generally use equipment that is found in Canadian sash and door plants. The prime difference between the two systems lies in the layout of the equipment. The Italian plants favour close coupling of a series of machines that in several cases carried special modifications of their original designed function. This was particularly true of the I.M.A.S. plant where mechanization had been carried to a remarkable degree of sophistication. Possibly this stems from the fact that I.M.A.S. offers turn-key projects as another aspect of its business and the plant serves as a showcase for potential customers. Close coupling introduces the probability of

reduced reliability of the coupled machines but the Italian approach serves to offset this through reduced operating speeds. Certainly, the tempo of workers and machines is much lower than that to be found in Canadian plants and productivity figures for I.M.A.S. bear this out. The overall lay-outs in the plants visited all reflected an almost extravagant use of space in comparison with Canadian practice. Material handling was thus important in the integration of the process centres and imaginative use of floor-mounted rollers, track transfers, power conveyors, etc., was very evident, particularly at I.M.A.S.

West German Plants

In contrast to the Italian operations, the German plants buy all their lumber requirements rather than sawing some of their lumber input in the millwork facility. Softwood lumber is used almost exclusively and this is purchased from Canada, the United States and the Baltic area in both kiln dried and green condition. Kiln facilities are modern and efficient. One technique developed by the Aldra-Werke was the kiln drying of profiled stock. Aldra-Werke claimed that results were good and that drying time was minimized with this approach.

The operations visited in Germany were primarily concerned with window manufacturing and the product is similar to that manufactured in Italy. The frames are given a prime and a second paint coat in the plant. Glazing and all hardware installation is carried out at the factory. The manufacturer is responsible for the installation of the windows at the job site. The finish coat of paint is applied on the job and is the responsibility of the painter on-site. In West Germany, a two-year warranty is extended to the buyer. In addition, the regulations call for a warranty of five years to cover any hidden defects which may develop during that period. All windows are sold as complete units, all interior doors are pre-hung in the factory and exterior doors are installed at the site.

As in the Italian plants, close coupling of processes was evident with wide use of specially-designed equipment throughout the production process. The significant difference is in the effective utilization of floor space coupled with a high loading factor on machine capability. Particularly at the Aldra company, this has resulted in high efficiency of production to manufacture a high quality product completely finished and ready for installation.

The German manufacturers are initiating production of plastic windows, apparently with favourable results. At present production levels, the plastic unit is at a price disadvantage of some 20-30 per cent compared with wood windows. Reduction of this price differential is a primary objective and, if this is achieved, the plastic window is expected to capture a significant share of the market. At present, 75 per cent of the residential and commercial windows are made of wood.

French Plants

Flush door manufacturers in France use a selection of softwoods, primarily from the Baltic area, coupled with some hardwood (Meranti) lumber for stiles and rails.

The plant visited did not appear to be a highly efficient operation and the level of waste, given as 60 per cent, serves as one indicator of this. Certainly, the lay-out of equipment, space utilization, the pace of machines and men all seemed lower than what had been seen earlier during the mission. However, this plant had developed one technique that was not seen previously -- pre-assembly drilling for hardware. Mission members were assured that the approach was indeed successful and that rejects after assembly were negligible. Thus, a high level of working accuracy was being achieved despite the first overall impression to the contrary.

In the millwork industry, the manufacturer is responsible for the erection and installation of his product. The quality of machinery was exceptionally high in all plants visited. An interesting feature is that cabinets are shipped knocked down and then assembled at the construction site by means of specially designed connectors.

British Plants

Of all the manufacturers visited by the mission, only the British plants produce a flush door that closely matches the type of door made in Canada and the United States.

Stiles and rails for these doors are Hemlock rather than the Cedar used in Canada and edging of the stiles with Malaysian hardwood (Meranti) is common in comparison with the solid Mahogany stile used in Canada. The paper core used for interior doors is a pure kraft material, in some cases specially treated, or a jute kraft and both are formed in a small hexagon cellular pattern that expands easily to fit the core space. Face materials in use include the conventional hardboards, Mahogany veneers on hardboard and plywood skins.

The manufacturing lines were generally well laid out and reflected a balanced use of coupling of processes in series with efficient manual and mechanized transfer equipment. This approach provided flexibility of operations not found in the rigid close coupling concepts in use on the Continent. As a result, the total shutdown of a production line seldom, if ever, occurred because of mechanical breakdown. The major impediment to sustained volume production seemed to arise from the inclusion of non-standard doors in the product mix. One company, operating parallel lines, was in the process of setting up a third line for the exclusive production of non-standard doors. All lines, through mechanical transfer, fed to an in-line finishing process that produced an excellent urethane finish on the hardboard door faces.

One of the largest plants visited on the tour, Boulton and Paul (Joinery) Limited, employs in excess of 1,500 workers. This plant produces trusses, wood windows, flush doors, wood and aluminum ladders, kitchen cabinets and television cabinets. The production of doors is approximately 2,000 doors per day.

Of the plants visited in Britain, only one was using a hot press (three-opening model) in the layup of flush doors. Use of the hot press was expected to be terminated shortly since studies indicated improved productivity could be achieved with a cold press. This is consistent with Canadian experience. No other plants visited made use of hot presses.

MANUFACTURING

Raw Material

Wood is still the major raw material used by the window, door and mill-work industries in the countries visited by the mission. Species include Douglas Fir, Scandinavian and Russian Spruce, Hemlock, Baltic Redwood, African Mahogany and Malaysian hardwood.

Several firms are developing plastic windows but none of the manufacturing plants visited have any significant production at this time. However, plastic windows appear to be the coming product and, with the rising cost of lumber and the desire for a finished maintenance-free product, it should gain consumer acceptance. The quality of the plastic windows being developed will equal the quality of wood windows.

The quality of hardware utilized on all products was very sophisticated, of the highest quality and excellent in design.

Windows

European windows are much larger than Canadian windows and are constructed of heavier components. For example, sash frames are made from 3 inches x 3 inches and sometimes larger material, whereas Canadian manufacturers use 1 1/2 inches x 2 inches with satisfactory results. Few windows are factory glazed and this could explain in part the use of heavier components. Some types of windows have slotted top and cross rails to allow glazing on-site with one large piece of glass being inserted from the top of the sash.

A major percentage of windows are made of several different species of Mahogany. All of these are factory prefinished and delivered following the installation of a pre-frame also supplied by the window manufacturers. In all cases windows are factory primed by a dipping process and are surprisingly well finished. Little use was made of weatherstripping in the past but it is now being incorporated more and more in the newly designed windows. In Germany 70 to 75 per cent of residential and commercial windows are made of wood. The majority of German windows are prime coated and many receive an additional coat.

The built-in roll down shutter is very much part of the European window. A box installed immediately above the window contains the shutter operated by cord from the inside. Shutters are made of either wood or plastic. Mission members had the opportunity to observe the production of both types in the large I.M.A.S. plant in Italy. Shutters provide privacy and security in addition to screening during heavy storms. In most instances lower insurance rates apply to shutter fitted homes. The life expectancy for wooden shutters was given at about 10 years with 15-20 years for plastic shutters.

Doors

Exterior doors are mostly of the stile and rail type and a high portion of them includes large glazed surfaces. This type is mainly constructed of solid Mahogany lumber. Several companies using lumber have been importing logs for a great many years. The exporting countries, in recent years, have become reluctant to allow exporting of logs and many are now imposing quotas limiting the quantity of logs to a certain percentage of sawn lumber. For this reason less expansion is being directed to the sawmill operation as most companies believe it is only a matter of time until sawn lumber only will be imported and, in many cases, in the form of dimension stock.

The use of gypsum board inside fire-doors to extend the fire-rating to one hour is considered unique. Alternative treatments include asbestos sheeting and cork interiors. Heavy wooden frames appear to have a higher fire-rating than steel frames due to low heat transfer.

Interior doors -- Flush doors are used almost exclusively. On the Continent the trend is to hardboard hollow-core doors with a veneer overlay. Some firms apply the veneer on the hardboard before they are glued to the frame, others after the doors are made up. In all cases, a matching edge strip is used and rabbitted both sides and top. Only in Britain did the mission see mass produced flush doors using Lauan plywood skins. There is a large segment of the industry that believes prefinishing of interior doors is the coming thing. One plant was either varnishing Lauan doors with matching edge strips or prime coating hardboard doors with unfinished edges at a rate of 190 doors per hour, complete with polyethylene shrink-pack wrapping. Two plants had installed the most sophisticated finishing equipment. I.M.A.S. in Italy had a semi-automatic conveyor system trimming, sanding and applying two coats of clear finish to doors. At John Sadd and Son Ltd., Division of Boulton and Paul (Joinery) Ltd., doors were given one white primer coat on both sides and oven-dried at the end of a completely automated trimming and sanding operation. One unique feature of interior doors in Britain is a solid wood edge banding about 1/2 inch thick of the same species as that used for the veneer to allow for close fitting when installing in frames built by the contractor. Flush door frames are always made of lower cost species of wood with higher priced lumber used for edge stripping of varnish grade doors. One manufacturer has a machine to produce cores by slicing Poplar blocks into shaving strips at sufficient

speed to supply the door assembly unit. All exterior and interior doors are individually packaged and marked.

Louvred doors -- The mission visited only one plant that was producing Louvred doors. The doors are made of Mahogany and components are much heavier than those used by Canadian or United States producers. They are used primarily for exterior shutters for large windows or French doors. In most cases they are supplied with heavy hardware and treated with preservative.

Door Frames

Interior -- Interior door frames are generally Mahogany, prefinished or prime-coated.

Exterior -- Exterior door frames are mostly factory prime-coated. In Britain, the metal waterbars used on thresholds are being replaced by a similar product of high density extruded plastic which performs well and is competitive in price.

Rolling Shutters -- This popular item on the Continent was formerly made of West Coast Hemlock or Fir. The production is now 95 per cent plastic and 5 per cent wood. This trend took place over the last five years.

Labour

The availability of labour, especially skilled labour, is one of the major problems facing the industry in Europe. In spite of excellent apprenticeship programs available in all of the countries visited, the industry cannot recruit sufficient workers.

In order to maintain an adequate labour force, some countries are recruiting and hiring immigrant workers to supplement their own labour force. In some of the German plants, 40 per cent of the labour force consisted of foreign workers. Another trend in the industry is the increased employment of female workers. In Italy and Britain, 25 per cent of the labour force consisted of female workers employed as machine operators, machinists, lift truck operators and assemblers. In some departments female employees perform all operations.

Machinery

The majority of plants visited by the mission were equipped with modern, high quality, precision production machinery. Most of the machinery was of European manufacture and of excellent design. Especially notable were the vertical belt sanders, computerized cut-off saws, finishing line machinery, horizontal panel saws, dowel machines and vacuum kilns. The layout of the machinery was arranged to give a continuous flow of production from raw materials to finished products.

Some of the machinery, designed to company specifications, was sometimes purchased outright or leased from manufacturers.

Material Handling

Exterior material handling varied from the direct off-loading of foreign ships at the manufacturers' own docks using large cranes to lift-truck loading and unloading and hand handling methods.

Generally in the plants visited by the mission, material handling in-plant was highly mechanized with automatic feeds, stackers and transfer units combined with conveyor belts and powered roller conveyors. These were arranged to provide a continuous production flow to the operation. In some plants, the flow of material appeared most efficient where track rollers were used with provision for adequate storage between the various production departments. This allowed for surges and breakdowns and provided a back-up supply for continuous operation by each department. In some of the larger plants, in order to reduce manual handling of semi-produced material, floor-mounted roller conveyors with transfer tracks were used to interconnect the various production departments.

The handling of glass to manufacture skylight units at the Aldra-Werke plant in West Germany was most impressive. Sealed glass units were picked up individually in the storage area by suction cups, automatically placed on a conveyor belt and transported underground to the assembly area. There they were picked up by suction cups and placed in the metal covered wood frame skylight window unit for assembly. This production line was fully automated and programmed to produce eight units per minute.

Packaging, Warehousing, Shipping

Windows, doors and architectural millwork products are individually wrapped in polyvinyl bags or sheets and then sealed to minimize damage, moisture penetration and pilferage. Finished products are properly labelled. Doors are shipped with locks installed and a key attached to the bottom edge. At the Aldra-Werke plant in West Germany prefinished windows are placed upright on pallets with spaces between the windows. When the pallet is filled the load is wrapped in polyvinyl and secured with steel strapping.

Most plants have large warehousing facilities but they are used mainly for the accumulation of orders prior to shipping rather than for storage of inventories of finished products. Most of the plants have no finished goods inventory as they manufacture to order and ship when completed.

Loading is done by forklift trucks and truck and trailer vans are used for shipping to the consumer.

Quality Control

The quality of the products manufactured in the plants visited range from good to excellent. This is due primarily to rigid product standards and the demand for high quality products by consumers. Every machine operator is responsible for the quality of the component he is producing. When the components are assembled into finished products, they undergo a rigid inspection in the quality control department and, prior to packaging and shipment, the product is given a final inspection.

Nord Deutsche Fensterfabrik, Hamburg, is providing windows to a concrete building system manufacturer to form part of complete exterior wall panels which are trucked to the building site. This plant has its own wind and water test equipment where windows can be tested to wind velocities up to 65 miles per hour. Pressure on high-rise buildings comes from every direction and testing to these conditions is essential to ensure an adequate seal.

The mission members were most impressed by the quality of workmanship and the high degree of finish prevalent throughout the industry.

RESEARCH AND DEVELOPMENT

European window and door manufacturers appear to be quite content to produce traditional designs. However, some of the larger manufacturers visited by the mission were carrying out research and development work on plastic windows. Mission members had an opportunity to see prototypes of finished plastic windows but company research facilities were not open to members.

There are two distinctly different types of plastic windows: those constructed of extruded ABS in either grey or white; and those foamed in various sized moulds. White ABS extruded window mouldings from West Germany are currently used in France and Britain. These countries are now developing their own production facilities. Expectation for plastic windows varies widely. The president of I.M.A.S., the large Italian window, door and shutter manufacturer, feels plastic will control 90 per cent of the window market in 10 years time, while the spokesman for the Nord Deutsche Fensterfabrik felt plastic would not exceed 10 per cent of the market in 10 years. There is a strong trend toward exposed wood components in West Germany. With home ownership becoming difficult for many, people are seeking the warmth and charm of real wood in their apartments.

Manufacturing techniques for plastic windows are still in the experimental stage. Low volume, hardware originally designed for wooden windows and uncertain market acceptance is preventing plastic windows from becoming a strong competitor at this time. Aldra-Werke in Bavaria is now producing a plastic foam window with a steel frame for stability.

Some hardware components are moulded into the structure. This was by far the finest and most highly developed product and no doubt the most interesting one seen by the mission. It appears some plastics are subject to attack by insects and the cost of plastic windows is still 30 per cent higher than wood. Until these problems are solved their market penetration will be limited.

In France, the mission members were invited to visit the Centre Technique du Bois (CTB) which has far reaching influence on the overall uses of wood in this country. The CTB does research on all aspects of wood utilization. It is responsible for writing and implementing the window and door standards and also issues qualifying labels and carries out in-plant inspections to assess quality of production. Fire-resistant doors are one area of research on which the CTB has worked extensively. By using a combination of particleboard, gypsum board and hardboard skins, it has been able to obtain satisfactory results and these data are being transmitted to the industry in general. The mission members toured the numerous test laboratories of CTB and also attended technical sessions involving key personnel from CTB accompanied by senior representatives from industry and labour unions.

Mission members had an opportunity to discuss the application and control of standards and most specifically the methods used to identify products from the standpoints of quality and source of origin. On the subject of identifying products, CTB has established a system using round coloured plastic discs, approximately 1/16 inch thick by 9/16 inch in diameter, which are driven tightly into a hole drilled at the top of the door. These discs cannot be removed without seriously impairing the product. The colour of the disc refers to the quality of the product and the embossed letters and digits identify the manufacturer. These are used in windows as well as doors but at the present time apply to interior and apartment entrance doors only and not to exterior doors.

The CTB is well-equipped to carry out tests on adhesives, laminates, wind and water infiltration in windows as well as being able to detect the amount of imperfection in the substrate appearing on the surface of flush doors, something that is rigidly controlled in the French market.

MARKETING

In the countries visited by the mission, in-plant pre-finishing is a definite trend. Europeans are advanced in the use of pre-finished millwork for residential construction but they have not yet implemented factory glazing of windows to any great extent. All mouldings supplied in conjunction with pre-finished doors and windows are also pre-finished at the factory using stain or varnish. Most of the pre-finished millwork products are supplied and installed by the manufacturer and sold directly to the contractor. Installation cost averages approximately 10 per cent of the selling price. Deliveries of millwork to residential

construction is from 90 to 120 days from date of order. This is due to the fact that, with the exception of exterior doors, the majority of millwork is custom-made and manufacturers do not stock standard items.

In Italy, marketing is generally handled through dealer organizations but manufacturers bid directly on large contracts.

In Germany, there is an effective lumber federation representing both producer and user industries. The millwork section of this federation is active in promoting the use of wood. It also writes and publishes standards for doors and windows and issues certificates to qualified manufacturers. Since association standards are specified on projects, in order to be accepted as a bidder a manufacturer must be certified by the association. As in Italy, large jobs are bid on the open market. There are also retail yards that are selling pre-finished millwork and in most cases offer site installation to their customers.

In France, jobs are also bid on the open market. Because of the great proliferation of millwork plants in France, said to total approximately 54,000, several marketing groups have been established. These groups known as Groupe d'Intérêt Economique (GIE) comprise small companies manufacturing windows, doors, millwork, etc., and, through joint marketing, they can offer a wide range of products throughout France. The mission members visited two of the plants -- the Drouot plant and the Six plant -- which are part of the Les Menuiseries Industrielles and the MIC 2000 group. This type of joint marketing organization has proved very successful in France.

In Britain, some standard units and components are sold through retail outlets and the majority of projects are bid on the open market. With the accession of Britain to the European Economic Community on January 1, 1973, the British joinery industry is gearing up to face the challenge and emerging opportunities. The nine countries, which comprise the enlarged EEC, represent a market of 256 million people with a gross production of \$635 million to form the world's largest trading group.

To summarize, the channels of distribution are similar in many respects to those existing in Canada. Some members of the mission identified opportunities for Canadian windows, doors and louvred doors and some were fortunate in establishing profitable contacts with European firms. At the writing of this report, the department has been informed that shipments from Canada have already resulted from the tour.

DESIGN

One of the objectives of the Technical Sash, Door and Millwork Mission to Europe was to study product design as it applies to the industry.

The purpose of participation by the Office of Design was to obtain a clearer understanding of the present and potential scope of this industry, to observe product innovation in Europe and to discuss the application of design with the mission members. This participation

was a complete success. Although design in the window and door industry is primarily of an engineering or functional character, it was most interesting to note the considerable difference between Canadian and European production techniques, marketing practices and raw material utilization. The mission members were introduced to totally different quality and types of products. Pre-finished, complete door units, common in Italy, France and Germany, as well as the multitude of window design and window hardware variations were possibly the most interesting features.

Interior Doors: In Canada, builders have the selection of paint grade hardboard covered flush doors, veneered doors of various imported species or louvred doors supplied in almost all cases without frame which is built on-site. Finishing or sealing is not performed at the plant. Recently, pre-hung doors have made their appearance for the residential market but, again, in the unfinished state. In Canadian commercial installations, plastic laminate covered doors installed and completed on-site are common.

In Italy, all interior doors are either completely pre-finished and supplied with hardware and frame, or sealed ready for painting in individual colours. Interior construction of the doors is similar to Canadian doors, possibly using a higher grade of lumber and heavier stock. The distinctive difference is in the hardware. While the butt hinge is common in Canada, all continental European doors use the pin and cap hinge installed at the plant prior to finishing, utilizing a variety of drilling, turning and installation machinery.

This type of hinge is faster to install, easier to adjust on site, less visual and allows doors to be removed simply by lifting. Variations in the hinge include single or double prong, nylon bushings or metal finish. The lock set is installed at the plant with the handles applied on-site. The quality observed in Italy, for both Italian and West German consumption, is far superior to that generally available in Canada. The basic difference here is that architects and homeowners demand this quality and are prepared to pay for it. Houses are on the average twice the cost of comparatively sized units in Canada. This is due to solid walls, heavier timber roof structures, high land cost and quality. Prefabricated components are used in institutional and commercial buildings but only to a limited extent in residential dwellings.

In Britain, the quality of interior doors is generally comparable to those on the Canadian market. They are produced on an assembly line and may have a clear finish, a sealer or are untreated. The common butt hinge appears to be standard in Britain, the same as in Canada.

In Italy and France there are many variations of interior door designs. Mouldings, contrasting colours and exotic woods are used to make each door a special component in the home.

With increasing labour costs on-site and lack of skilled craftsmen employed by construction firms, it is most conceivable that the European type door, pre-fitted and pre-finished, has its place in Canada. Selection of hardware, colours and veneers could to a great extent be left to the design division of the manufacturer. Members of the mission felt the introduction of totally pre-finished and pre-fitted doors to the Canadian construction scene was most feasible.

Exterior Doors: Exterior door manufacturing follows closely that of interior doors. Pre-fitting and pre-finishing was frequently the case with a variety of styles and wood species. Door styles did not differ greatly from those offered in Canada but included all hardware, frame and sometimes installation by factory crews. Again, the quality shown was very high. Mail slots and knockers were installed by the customer while any glass was part of the original assembly. Manufacture of exterior doors in France and Britain was on a semi-production basis with a great amount of hand labour, hand fitting and wood selection. Due to the variety of designs and limited quantities, mass production does not appear feasible.

Windows: It must be recognized that windows in Europe are put to a greater variety of uses than in Canada. Habits such as airing bedding and the home every morning, the near total absence of insects and the milder climate make the design of windows different than in Canada. On an average, the hardware per unit in a Canadian window is only 10 per cent of that used in Europe. Many units tilt in or out, swing open with double action hinges or turn on their own axis, to permit maximum opening. The hardware to accomplish this is complicated and expensive. No major difference was found in Italy, Germany or France except for the fact that double glazing or insulation glass is standard in northern sections while in southern areas single glazing is adequate. No flyscreen is installed anywhere.

A major difference between Europe and Canada is the widespread use of wooden windows in European high-rise apartment buildings. They are usually built to architects' specifications, are of quality construction and are installed by the manufacturer. This type of window, with European-type hardware and mechanisms and designed for the Canadian climate, could represent an opportunity for Canadian wood window manufacturers as multiple dwellings form an increasingly important part of the nation's residential construction.

In France, the mission visited two architectural millwork plants -- one supplying custom woodwork to shops, offices and institutions in the greater Paris area and the other concentrating on building special furniture for hotels and institutions around the world. Both plants have their own design staff producing original designs for customers in addition to drawings provided by architects. All plants have a product engineering office. The term industrial designer is not used nor is their use very evident. Despite the range and quality of products,

mission members observed great similarity between all, and real innovation was left to a few special items such as the plastic and skylight windows at Aldra-Werke.

In conclusion, design is a very significant factor of this industry and, if applied carefully, can make great contributions. In Canada, product development is largely by management participation and plant engineering and is influenced by current trends. Design in the millwork industries is functional in which the architectural styling, security, weather conditions and human inhabitant must be considered. Aesthetically design can express itself in the neatness of details, visible hardware and materials utilized. Industrial designers, currently used only sparingly in Canada in the development of building components, can definitely contribute significantly once the industry becomes innovation conscious and designers have the opportunity to study the potential and need of the industry.

ACKNOWLEDGEMENTS

The members of the mission wish to express their appreciation to R. K. Thomson, Consul General, M. C. Spencer, Consul and Trade Commissioner and J. Carretoni, Commercial Officer, Milan, Italy; E. H. Maguire, Consul General and W. B. Schumacker, Consul and Assistant Trade Commissioner, Hamburg, West Germany; C. T. Charland, Minister-Counsellor (Commercial), D. E. F. Taylor, Commercial Counsellor and Miss Chantal Balas, Commercial Officer, Paris, France; J. H. Stone, Minister (Commercial), T. A. Charles, Commercial Secretary (Timber) and C. I. Rooke, Commercial Officer, London, England, for their time and effort in organizing the visits and for their assistance during the mission.

The members also wish to thank all the representatives of the companies and associations visited for their kindness and for the very friendly reception and co-operation extended them during the European tour which helped to make it such a pleasant one.

ITINERARY

Canadian Sash, Door and Millwork Manufacturers Technical Mission
to Europe

Milan, Italy - March 4 - 7

Companies Visited

Comments

GIACOMELLI, S.p.A
Infissi in legno
10075 Mathi (Torino)
Via Torino 13
Ferdinando Giacomelli, President

window and door manufacturer

IMAS
Industria Medolese Avvolgibili Serramenti
46046 Medole
Via S. Martino, 20
Mantova, Italy
Cesare Soragni, President

window and door manufacturer

SIS, s.a.s.
Societa Industria Serramenti
Stabilimenti di Cavriana
Via Corce Bianca
46040 Cavriana (Mantova)
Mr. Bergamini, General Manager

door, louvred door and
window manufacturer

Hamburg, West Germany - March 7 - 10

ALDRA-WERKE
E. Albers & v. Drathen
2223 Meldorf/Holstein
West Germany
Peter Albers, President

window and door manufacturer

NORD-DEUTSCHE FENSTERFABRIK
2 Norderstedt 3
Friedrichsgaber Weg 256-60
West Germany
Hans Stave

BAUZENTRUM
2 Hamburg 36
Esplanade 6A

Permanent exhibition of
building components and
building materials

PETAL-WERK
2 Hamburg-Norderstedt
Erlengang 32
Heinrich W. Peters

Plastic window manufacturer

Paris, France - March 10 - 14

Visit to the CHATEAU DE FONTAINBLEAU

Group met by Mr. de Cidrac, Architecte en chef des Bâtiments et des Palais Nationaux, Conservateur du Domaine National de Fontainbleau. Mr. Cidrac explained in detail architectural millwork and woodwork panelling of the castle. This was followed by a visit to the Chateau de Versailles where members of the mission had an opportunity to visualize the expert restoration work.

ENTREPRISE R. PERRONNET
219 Ave du General de Gaulle
94170 le Perreux-s-Marne
Paris, France

visit to head office and
Design Department

Plant at 60 Breteuil-s-Noye (Oise)
Raymond Perronnet, President

architectural millwork and
modular cabinet manufacturer

ENTREPRISE KRAEMER
93 Bagnolet
Paris, France
Plant at Bethisy-St Pierre (Oise)
Mr. Kraemer, President

custom millwork manufacturer

ENTREPRISE PIERRE MONTHULE
Saint-Denis les sens
Pierre Monthulé, President

custom millwork manufacturer

MIC 2000
Les Menuiseries Industrielle
1) Usine DROUOT
Brevonnes, France
Mr. Drouot, President
2) Usine SIX
Vendeuvre (Aube) - France
Mr. Six, President

door and shutter manufacturer

window and door manufacturer

Meetings at Centre Technique du Bois (CTB)
10 Avenue de St. Mandé
75012 Paris, France
Discussions with:

- Union National des Chambres Syndicales de Charpente
- Syndicat National des Fabricants de Menuiseries du Batiment
- Syndicat National des Fabricants de Menuiseries Industrielles
- Syndicat Francais des Fabricants de Portes Planes, F.E.M.I.B.

London, England - March 14 - 17

EAST & SON LTD.
Gossoms Lodge
Gossoms End, Berkhamstead
Buckinghamshire
John H. Lenanton, Managing Director
J. C. Wilding, General Manager

millwork, metal and plastic
window manufacturer

WALTER LAWRENCE (SAWBRIDGEWORTH) LTD.
Sawbridgeworth
Hertfordshire
B. M. Thornton, Chairman and
Managing Director
H. J. Search, Deputy Managing Director

architectural millwork manufacturer

RIPPERS LTD.
Castle Hedingham
Halstead, Essex CO9 3EP
A. Michael E. Ripper, Managing Director
Steven L. D. Ripper, Sales Director
H. James H. Ripper, Personnel Services Director
Robert A. Burnet, Financial Director
Eric T. Judd, Production Director

millwork, window, door, stairs
and kitchen cabinet manufacturer

BOULTON AND PAUL (JOINERY) LIMITED
JOHN SADD DIVISION
Station Road
Maldon, Essex CM9 7LH
Robert D. Shanks, Managing Director
R. W. Jarvis, Managing Director

doors, kitchen cabinets, television
cabinets, trusses,
ladders manufacturer

Meeting with officers of the
BRITISH WOODWORK MANUFACTURERS ASSOCIATION
26 Store Street
The Building Centre
London W.C.1
Bernard E. Crysell, President
Peter Allnatt, Director
Douglas E. Hall, Secretary

PAPER ON BRITISH JOINERY INDUSTRY

Presented to Canadian Sash, Door and Millwork Manufacturers Technical Mission to London, England, on March 16, 1973

By - B. E. Crysell, President, British Woodwork Manufacturers Association

I prefer to think of this as a potted version of the British woodworking industry.

I can speak with some slight knowledge of your own woodworking establishments, having had the pleasure of visiting a number of companies across Canada in 1963 and it is very nice to be associated with some reciprocal hospitality.

Firstly, it is worthwhile to consider what is perhaps the most important basic difference in our two countries. Canada has a population of some 21 million, U.K. has between 50/55 million. Housing, to which the bulk of our products go is 150,000 completions per annum in Canada, U.K. is 350,000/400,000 and added to this you have to consider a large market for maintenance in U.K. because of a historic policy in this country of buildings to last forever. Geographically it will be noticeable to those of you who have not been here before that U.K. is a very small place (you could lose England in Nova Scotia). So, you have a market roughly one third of ours both in numbers of people and houses and a transport problem of some magnitude. This is without giving any consideration to the effect of U.K. entry into the Common Market in Europe which is an untapped source, the implications of which we have hardly had time to grasp.

Structure

The structure of the U.K. joinery (or woodworking) industry is, I imagine, not very different from Canada. We have 6 - 10 what we could call large firms producing doors, windows, staircases etc. with some of them specializing in one single product such as doors or windows. The latter are few and far between and tend to be very specialized producing a range of standard products on a highly automated basis. As an example, one of the leading firms of window manufacturers in the U.K. produces between 20 - 25,000 windows per week, whilst a similar company, specializing in door manufacture, has an output of a mixed range of doors of 15,000 to 18,000 per week. Then we have something like 30 - 40 companies which specialize in one or two products or lines produced by batch production methods and often with the remainder of their output of a very diversified nature -- perhaps handling enquiries for general joinery often with comparatively short runs designed for a specific project. The third category is by far the most numerous, usually small (50 employees or less) but it accounts for a large proportion of our national output of general architectural joinery. These firms will take on literally any job from windows, doors, stairs, internal fittings

in hardwood softwood from "one offs" to quite large numbers, provided the programming allows them to undertake the job. Between these three categories the requirements of most builders and architects can be met and, although there is a big demand particularly in the public sector for standard joinery, there is still a great demand for those items which are the whim of the architectural profession and will probably remain so.

Raw Material

For fairly obvious reasons the majority of standard joinery is softwood of Scandinavian, Russian or Canadian origin. Hardwoods of many varying species are used on sills and thresholds of even cheap standard joinery, whilst there is a ready market for the higher class specialist work to be in hardwood.

Machine Technology

Until some years ago enterprise and innovation was not the keynote of woodworking machinery manufacturers. I have always felt that we were the poor relations of the machine tool industry. Perhaps this was due to the fact that the industry was, and still is, to a large extent fragmented and that individual firms (with some exceptions) had neither the capital nor the necessity to acquire expensive sophisticated machinery and that, with this comparatively negligible demand, the machine manufacturers were not encouraged to invest in research. Another point on this is that woodworking machinery has a fantastically long life -- few moving parts -- slow speeds -- and over-designed castings is the reason that it is not uncommon to see machines 50 years old doing a good job.

In more recent years, however, the woodworking machine industry has come up with sophisticated refinements to accepted and well tried principles, together with machines which have been conceived largely as a result of new materials. The increased use of board materials and the problems connected with finished surfaces, lipping, etc., on such things as blockboard and chipboard are classic examples. But in the U.K. considerable attention has been given not so much to the machine that actually does the job as to the more efficient handling of components and automation between machines.

Such innovations as tilt hoists, power feeds and traverse tables have enabled resaws, moulders and crosscuts to form efficient production lines with a minimum of operatives.

Still more recently, punched tape control is becoming more evident in woodworking factories although it is not new in the machine tool world. One of the more recent advances is a computer controlled crosscut.

When a cutting list is fed into the machine's mini-computer, the machine will automatically measure each piece of timber as it comes from the stack, decide how best to cut it to give minimum wastage, make the cuts, and sort the cut pieces by sizes into the correct out-bins. A series of incrementally-placed photo-electric cells are positioned along the conveyor. These measure the length of the incoming timber and transmit this information to the computer which works out the most economical lengths to be cut. The makers estimate that the machine should be able to cut avoidable timber wastage by at least 60 per cent and labour costs by between 50 and 60 per cent. The main advantage is naturally seen as being to the larger user, particularly those cutting more than 5000 m³ a year.

As something like 90 per cent of the woodworking industry uses a crosscut saw as the initial operation and as waste can be as high as 10 per cent with a large part of it coming from the cross-cutting process, the potential benefits are clear. Cost of machine including the computer is £15,000.

An essential feature of the Timber Tape principle is the roller feed mechanism which controls the movement of timber passing through a machine accurately enough to make it possible to dispense with stops, depending instead on the ability of the roller drive to stop the workpiece exactly at the right place for the next cut or other operation to be made.

Firstly, number-off and length of each piece-part in the cutting list is entered into the control unit. The computer, according to a defined set of rules and length priorities, computes the cutting pattern to make the most efficient use of the incoming random length of timber. The computer makes all the cutting decisions with the exception of the trim cut.

With this machine a manufacturer will have, for the first time, an exact record of incoming material and also an exact waste figure. The computer keeps a running total of the number and length of pieces fed, the number and length of piece-parts cut, the trim, saw kerf and avoidable waste. A printed statement of this information is available at the control unit at the end of each piece-part requirement cycle.

One thing that struck me most forcibly during my visit to Canadian plants was the do-it-yourself approach. I saw a number of ingenious machines and methods saving considerable time and labour and came to the conclusion that you were really more conscious of the efficiency to be achieved by such innovations than we are.

Marketing

With a few exceptions I don't think marketing in the "detergent" sense has reached the joinery industry in the U.K. The smaller companies

tend to operate in localized areas and get their business largely from recommendation and repeat orders. Medium and large companies, whilst having quite small advertising appropriations, sell through representatives, although a few do make an attempt to market through retail outlets. Few such outlets carry stocks probably for two reasons -- one, they don't wish to tie up the capital; and, two, the range is too great. Contrary to this, one company has set up cash and carry. On the point of ranges of standard windows and doors, a lot of work has gone into the development of dimensionally co-ordinated sizes.

These moves were given new impetus when we changed to metric when it was thought that when we changed from one foot to 300 mm this might automatically overcome anomalies in dimensional controls. This has proved not to be the case but the British Woodwork Manufacturers Association has probably done more successful work in this field than any other institution. Finally, research into better performance standards, aimed to keep timber windows and doors in the lead against competitive materials, has been undertaken. For instance, the British Woodwork Manufacturers Association has designed and issued a technical brochure on high performance windows. Tests have proved these designs to be far superior in low air leakage, high rain resistance and with excellent thermal and sound insulation. It is this type of approach which is so necessary if we are to keep our industry alive and in the forefront as suppliers to the building and construction industry.

Cyril Rooke, in his invitation to me to speak to you said, "you might cover the U.K. joinery industry, its problems and its future." The industry I have tried to cover. The problems I don't propose even to attempt. As to the future, everyone in business has to be a superb optimist to survive. We continually apply ourselves to technological advancement and, provided we inject more marketing expertise into the industry, there is nothing to stop expansion of this industry to an unprecedented level. Our future, I am sure, lies in market development and it is inevitable that we turn to Europe for this expansion.

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