

A technical assessment of the market for wood windows in Japanese post and beam construction

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Abstract

This research was conducted to develop a better understanding of the problems and opportunities confronting U.S. wood windows manufacturers in the post and beam segment of the Japanese residential construction industry. The specific objectives of this research were to: 1) provide a description of the Japanese market for wood windows; 2) survey Japanese builders regarding use and specification of wood windows, both domestic and imported; and 3) recommend strategies for increasing the competitiveness of U.S. wood windows in the Japanese post and beam market. To obtain primary information on the use and perceptions of U.S. wood windows by Japanese post and beam construction professionals, a short survey was administered to 87 Japanese construction professionals. In addition, approximately 50 post and beam construction sites were visited to evaluate window installation techniques, discuss problems associated with using U.S. wood windows in post and beam homes, and identify potential solutions. This research suggests that standard U.S. window sizes can be easily accommodated into the post and beam construction system used in Japan. However, product design and the range of services being offered have a substantial impact on the competitiveness of windows in Japan. U.S. wood window manufacturers should at least consider the following actions to increase the competitiveness of their products in the future: 1) establish training and education programs for Japanese construction professionals; 2) produce and distribute a generic window installation manual in Japanese; 3) translate product and installation information into Japanese; and 4) provide technical support and replacement parts for their windows in Japan. This research clearly shows that with a well developed strategy, U.S. wood window manufacturers can be competitive in the Japanese post and beam construction market.

The current economic downturn in Japan has seen residential housing starts drop from 1.64 million in 1996 to 1.1 million in 2002. The impact of the decline in Japanese housing starts on U.S. exporters has been dramatic. U.S. Department of Commerce export statistics for 2001 indicate that U.S. exports of primary and value-added wood products to Japan were down by 68.8 and 55.4 percent, respectively, from 1996 levels.

Historically, U.S. value-added wood marketing efforts have focused on developing the market for North American-style 2 by 4 homes in Japan. Although the North American 2 by 4 construction technology has been rela-

tively successful in Japan, 2 by 4 housing starts represented just 6.6 percent (77,235 homes) of total housing starts in 2001. In contrast, traditional wood post and beam housing starts represented 38.5 percent (451,815 homes). In response to the weakened demand for im-

ported wood building materials within the 2 by 4 segment of the housing industry, some U.S. exporters have begun to consider opportunities for wood building materials in the post and beam market. However, non-tariff barriers (such as reduced mortgage rates for post and

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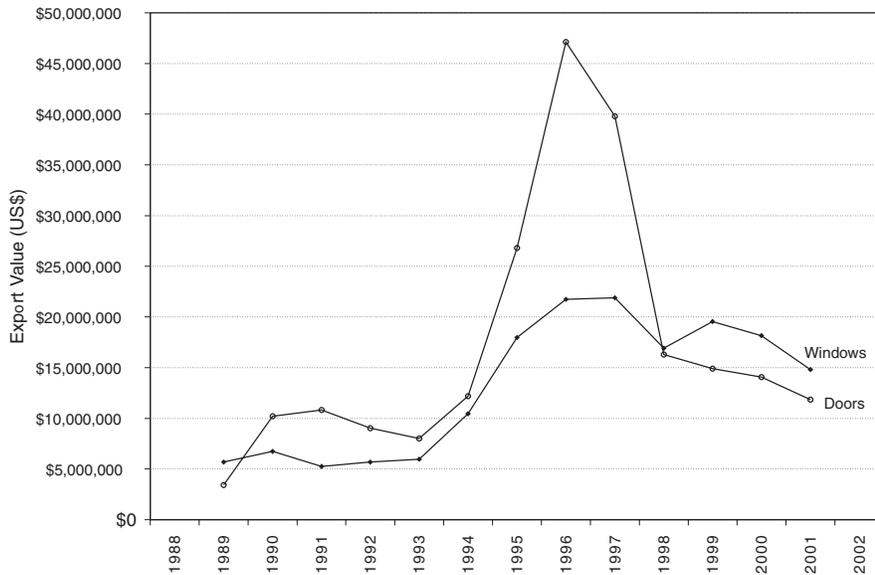


Figure 1. — U.S. exports of wood doors and windows to Japan.

beam homes using domestic timber species and fire code restrictions for wood windows and doors used in fire and quasi-fire zones) adversely impact the competitiveness of U.S. value-added wood products in the post and beam segment of the Japanese housing market (Eastin et al. 1998, Eastin and Hashizume 2000, Eastin et al. 2001b).

Another important problem confronting U.S. manufacturers and exporters relates to the product specification process employed by Japanese post and beam builders. Many U.S. exporters have indicated that, while Japanese contractors building North American-style 2 by 4 homes tend to source many of their building materials in the United States, post and beam builders are much more conservative in their use and specification of imported building materials (Cunningham and Eastin 2002).

This research was conducted to develop a better understanding of the problems and opportunities confronting U.S. wood windows in the post and beam segment of the Japanese residential construction industry. The specific objectives of this research were to: 1) provide a description of the Japanese market for wood windows; 2) survey Japanese builders regarding use and specification of wood windows, both domestic and imported; and 3) recommend strategies for increasing the competitiveness of

U.S. wood windows in the Japanese post and beam market.

U.S. exports to Japan

Despite their extensive forest resources and wood processing industry, Japan has long relied on imports to provide the majority of their raw material requirements. The United States has been an important supplier of primary wood products and has been increasingly expanding exports of secondary wood products to Japan (Eastin et al. 2001a).

The vast majority of wood products exports from the United States to Japan have traditionally been in the form of primary wood products, including softwood logs, lumber, and chips. While primary product exports to Japan stabilized at about \$3 billion during the period 1993 to 1996, secondary wood products exports increased by 192 percent, accounting for virtually all export growth during that period. As a result, the ratio of secondary wood products to primary wood products increased from 4.3 to 12.8 percent. The Asian economic crisis in 1997 and the ongoing weakness of the Japanese economy have taken a heavy toll on U.S. wood products exports to Japan. During the period 1996 to 2001, primary wood products exports to Japan declined by 69 percent while secondary wood products declined by 55 percent.

Given the steeper drop in primary exports, the ratio of secondary wood products exports to primary wood products exports actually increased from 12.8 percent in 1996 to 18.2 percent in 2001 (Eastin et al. 2001a).

U.S. exports of wood doors and windows display different trends over the period 1989 to 2001 (Fig. 1). Export performance for both products was relatively stable during the period 1989 to 1993, followed by substantial export growth from 1993 to 1996 when exports of wood doors surged from \$3.4 to \$47.1 million and wood window exports jumped from \$5.7 to \$21.9 million. Subsequently, wood window exports dropped to \$14.8 million in 2001 (a 32% drop) and wood door exports plummeted to \$11.8 million (a 74.9% drop). Prior to the Asian crisis, U.S. market share for wood windows had remained fairly constant at approximately 60 percent (Fig. 2). However, by 2001, the U.S. market share had declined to 42 percent. Over the period 1990 to 2001, the Canadian share of the wood window market increased from 3.9 to 11 percent while the European Union market share declined from 30.1 to 26.3 percent. Interestingly, the Swedish market share increased from 5.8 to 10.3 percent while the Danish share fell sharply from 22.6 to 10.6 percent (Eastin 1999, Eastin et al. 2000).

The difference in export performance for wood doors and windows can be attributed largely to the increasing price sensitivity of Japanese builders and the level of production technology required for each product. For example, Japanese door manufacturers have successfully established production facilities in countries where raw material and labor costs are low and environmental regulations are few. Window manufacturing technology, in contrast, is comparatively more sophisticated and Japanese window manufacturers (who largely focus on aluminum and vinyl window products) continue to favor domestic production facilities. Obviously, the implications are that U.S. wood door manufacturers find themselves competing against lower cost producers in southeast Asia while wood window manufacturers are competing against domestically produced aluminum and vinyl windows. As a result, U.S. wood window manufacturers find themselves competing in a relatively small niche market where they have a competitive

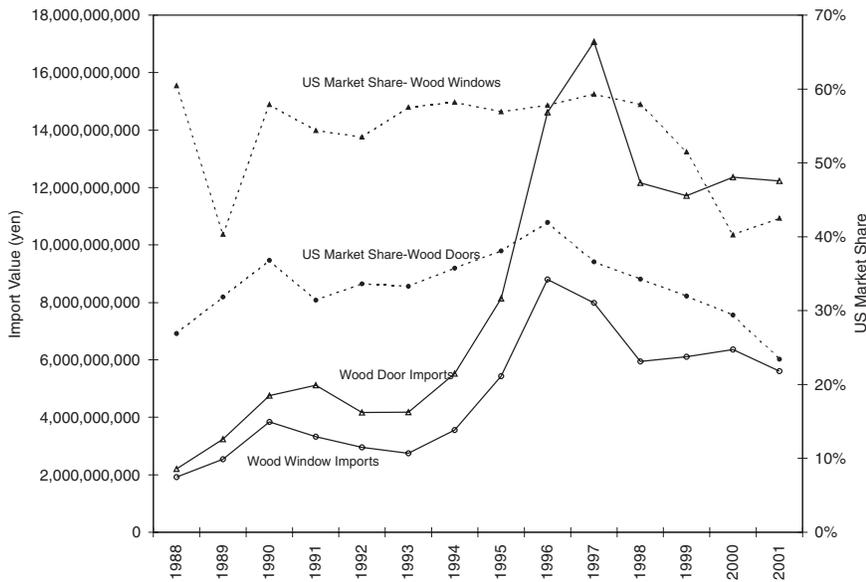


Figure 2. — Total import value of wood doors and windows in Japan and U.S. market share.

advantage against their Japanese competitors. While there is no import duty applied to wood windows, a 4.3 percent duty is imposed on vinyl window imports. In addition, a 5 percent consumption tax is applied to all imports and domestic windows (JETRO 1997a).

Overview of the Japanese window market

According to an estimate by the U.S. and Foreign Commercial Service (US&FCS 1997), the total Japanese window market is approximately \$4 billion. A majority of the residential windows are aluminum, but wood and vinyl windows have been slowly gaining market share. The window market in Japan is dominated by the large aluminum manufacturers, most of whom are members of the major corporate groupings (*keiretsu*). Aluminum windows comprise approximately 90 percent of the Japanese residential window market. Aluminum windows have been used in Japan since 1932 and have been widely adopted because they are lightweight, sturdy, weather resistant, and were grandfathered into the building code as non-combustible. Vinyl windows are a distant second in Japan with a market share of approximately 8.5 percent, while wood windows represent only about 1.5 percent of the window market (Japan Sash Association 1998).

The major manufacturers of Japanese aluminum windows are YKK, Tostem, Asahi Glass, and Fuji Sash (see website

information at the end of the citations list). The dominant manufacturers of vinyl clad windows are Tostem, Tokuyama, and Mitsui. The dominant type of window in Japan is the slider window, with a 52 percent share of the window market, although many other types of window styles are utilized. In 1996, the estimated size of the Japanese wood window market was \$99 million, while the market for vinyl windows was \$320 million. The combined wood and vinyl window market was \$419 million, a 31 percent increase over 1994 (US&FCS 1998).

Product features and accessories

As a result of the intense competition within the electronics industry, Japanese consumers have come to appreciate and expect a broad selection of product features and accessories in virtually all product categories. Whereas a decade ago most window manufacturers limited product options to sliding rain screens (shutters), the range of window options has expanded considerably today. For example, sliding rain screens have largely been replaced by roll-up rain screens. The evolution of roll-up rain screens highlights the continuing efforts of window manufacturers to offer new product options to consumers and differentiate their products from those of their competitors. The first generation of roll-up rain screens were operated with manual hand cranks. The second

generation of rain screens offered motor-driven screens, while today's models can be operated by remote control.

The newest generation of windows offers rain screens with adjustable louvers. These not only provide security and protection from the rain (particularly during the typhoon season when driving rain can often cause moisture infiltration around window openings), but they also allow the homeowner to regulate the level of natural lighting in the room. Learning from the U.S. window industry, many Japanese window manufacturers now offer a wide variety of window coatings and tints as well as windows with a broad range of thermal and noise-reduction characteristics. The larger window manufacturers are constantly looking to develop new product features that meet the needs of home buyers, while providing them with an opportunity to differentiate their products from those of their competitors.

New energy savings standards

The Japanese government has programs to reduce Japan's dependence on energy and this includes incentives to encourage energy-efficient homes. In 1992, energy savings standards for new houses were strengthened. This revision included three main points: 1) Japan was divided into six regions, energy savings standards were set for each region, and heat loss coefficients that measure insulation values also became more stringent; 2) air tightness housing standards were created for northern Japan; and 3) sunlight retention coefficients were established for summer cooling loads in southern Japan.

Public financing has been used as a tool to promote the acceptance of these standards by manufacturers and home builders. New housing that complies with these standards qualifies for higher levels of financing from the Government Housing Loan Corporation (JETRO 1997a). These programs provide an excellent opportunity for U.S. wood window manufacturers to market their products to Japanese home builders. For example, the Japanese Government Housing Loan Corporation offers subsidized interest rates for homes that include energy-efficient products such as insulated wood windows.

Distribution channels

The distribution channels for Japanese wood windows are not particularly

complex or extended, as is the case in other sectors of the Japanese economy. The distribution of windows in Japan involves a number of participants including manufacturers, primary wholesalers, secondary wholesalers, retailers, and home builders. These distribution members perform a variety of functions, including production, parts inventory, credit, installation, and technical service. Distribution can generally be divided into two main channels: the wholesaler/dealer channel and the direct sales channel. Most window manufacturers utilize both channels. The wholesaler/dealer channel accounts for approximately 75 percent of all window sales, although direct sales from the manufacturer to the builder have been increasing. In the wholesaler/dealer channel, the manufacturer ships the window frame without the glass installed. The glass pane is then inserted by the dealer or retailer prior to being shipped to the jobsite. The distribution of wood windows without glass panes in Japan runs counter to the U.S. practice of shipping completed window units direct from the factory.

Characteristics of the Japanese wood window industry

Japanese wood window manufacturers are generally small firms serving a regional niche market. Most of these firms utilize relatively modest technology to produce a limited product line that is marketed towards a high quality, niche market. This niche market is characterized by home buyers who are willing to pay a premium price for a high quality, high performance custom wood window that incorporates custom features like expensive European tilt-and-turn hardware and fire-resistant construction. Given their focus on the high quality niche market, it is no surprise that Japanese wood window manufacturers offer comprehensive service policies for their products, including technical support (for both installation and maintenance), parts, and extended product warranties (Eastin et al. 2001b).

Most wood window manufacturers in Japan employ a combination of basic processing technology and labor-intensive manufacturing techniques to produce a high cost, high quality window. Window sashes are often manufactured from composite lumber incorporating straight-grained lumber with narrow growth rings from which all defects have

been removed. The laminated member is then covered with a very high quality veneer overlay to produce an aesthetically pleasing, structurally stable window component. Japanese wood windows are manufactured in an extremely wide variety of sizes and window manufacturers pride themselves on their ability to produce custom windows for virtually any size of window opening. The production and finishing processes employed by most wood window companies is highly labor intensive. The inevitable impact of low levels of automation, high levels of product customization, and labor-intensive manufacturing techniques is that Japanese wood windows are very expensive, costing almost three times more than a similar style of aluminum window and 50 to 100 percent more than an imported U.S. wood window (Eastin et al. 2001b).

The modern wood window industry in Japan is relatively new and struggling to find its place in the window market. Regulatory changes that favor energy efficiency and soundproofing ability in windows may help the wood window industry expand their market presence. The Japan Wood Window Association, affiliated with the Japan Housing and Wood Technology Center (HOWTEC), was recently established to help in the promotion of wood windows within the residential construction industry. Currently, the association has 16 wood window manufacturers in its membership (Japan Sash Association 1998).

Problems impacting the competitiveness of U.S. wood windows in Japan

Historical window designs

Historically, Japanese wood windows have been based on a design of wood frames and paper *shoji* screens. Traditionally, many Japanese have viewed the outside as an extension of the interior of the house, and these types of windows and doors were an integral part of the effort to reduce the barriers between the outside and inside environments. This window design has greatly influenced the Japanese preference for double slider windows and doors.

Prior to 1960, locally manufactured wood windows were widely available and commonly used throughout Japan. However, these windows were poor quality and had serious problems with dimensional stability, water infiltration,

durability, noise reduction, air infiltration, and thermal efficiency. In addition, the wood windows were usually made by a window manufacturer while the window sash and sliding tracks for the *shoji* were generally fabricated on-site by a wood fittings specialist (*tateguya*) who crafted each door and window to fit the individual size of each door and window opening (which were generally not standardized). Thus, each door and window was essentially a custom size and, as a result, there was often a poor fit between the window and sash, adversely affecting the thermal efficiency and noise-reduction performance of windows and doors, as well as their ability to resist air and water infiltration. Interestingly, the poor weather tightness of older Japanese wood windows meant that they were not subject to moisture buildup on the interior of the window pane as the next generation of weather-tight aluminum windows would prove to be (Eastin et al. 2001b).

Obviously, these problems contributed to the poor perception of wood windows and provided a market opportunity for aluminum manufacturers in Japan. When aluminum windows were introduced into the market in the 1950s, they achieved rapid market success because of their effectiveness in providing protection against the elements. While the quality of wood windows has improved dramatically in recent years, these quality improvements have been accompanied by significantly higher prices. As a result, the price of a wood window is approximately three times higher than a similar aluminum window in Japan. The adoption of aluminum windows has also been favored by the fire regulations.

Recently, builders, consumers, and industry experts have been increasingly recognizing the inherent limitations of aluminum windows in the following areas (Eastin et al. 2001b):

- poor fire resistance;
- poor thermal efficiency;
- poor soundproofing characteristics;
- condensation buildup on interior window surfaces;
- formation of mold and corrosion on interior window frame components;
- poor air infiltration performance (due largely to product attributes such as weep holes and double sliding window design).



Figure 3. — Windows are often framed in between the structural posts in Japan.

U.S. windows are designed to provide protection against the elements while maintaining the thermal efficiency of the home. In order to accomplish these objectives, the seal around the sliding window sashes of a U.S. window fit tightly to minimize air infiltration and moisture penetration. However, providing an effective air and moisture seal in a window necessarily increases the amount of force required to get the window moving (breaking force) and to maintain that movement (sliding force). Thus a trade-off exists between the weather tightness of a window and the force required to operate the window. Many Japanese are unaware of this relationship and often favor a Japanese window because of the ease of operation without understanding the impact of their choice on performance. This is particularly true of Japanese women and senior citizens. Given the temperature extremes and strong winds and rains experienced in Japan, it would seem that a tighter, more thermally efficient window would be attractive (Eastin et al. 2001b).

Japanese homeowners also have a strong preference for double slider (where both window panes slide) and casement windows that operate smoothly and require little force to move. In contrast, U.S. homeowners more often favor energy efficient double hung windows or single slider windows

(where only one pane slides and the other is fixed) with a stiffer movement that requires more force to move. While the Japanese preference for double slider windows does not pose a significant problem for U.S. window manufacturers, the Japanese preference for windows that operate smoothly and require a minimal amount of force to move is more problematic and will require a targeted promotional campaign to communicate the trade-offs to Japanese builders and home buyers (Japan Sash Association 1998).

Fire safety regulations and fire zones

Japanese fire safety regulations fall under the Ministry of Land, Infrastructure, and Transportation (MLIT) and are specified within the Building Standards Law (BSL). These regulations were summarized in a report by the U.S. and Foreign Commercial Service. Japan fire regulations are divided into fire protection districts (fire zones), semi-fire protection districts (quasi fire zones), and regular non-protected districts (non fire zones). Fire zones include most of Japan's urban areas while quasi fire zones include most of Japan's suburban areas (Eastin et al. 2001b).

Wood and vinyl windows do not need to comply with fire safety regulations if they are used in non fire zones. However, for installation within fire zones and quasi fire zones, wood and vinyl windows must comply with the fire safety regulations. These regulations are based on exterior "portions liable to catch fire." These "portions" are defined as three specified areas: the boundary line with the adjacent land lot, the center line of a road, and the center line between external walls of adjacent buildings on the same site. Windows must be installed 3 meters or more for the first floor and 5 meters or more for the second floor from the specified areas described in the previous sentence. Due to these regulations, most wood and vinyl windows may not be used in urban and suburban areas. Since these regulations were passed in 1991, 39 Japanese wood windows have received fire protection approval. Japanese window companies have managed to circumvent the fire regulations by producing aluminum clad vinyl windows (these are essentially a vinyl window with an aluminum exterior cladding) (JETRO website).

Metric size of building module

With regard to the specification and use of U.S. wood windows in Japan, it has often been speculated that the use of metric sizes by Japanese window manufacturers and the use of a different construction module has restricted the competitiveness of U.S. windows in Japan. In the United States, builders employ a 4-foot by 8-foot construction module, while Japanese builders use a 3-*shaku* by 6-*shaku* (approximately 3-ft. by 6-ft.) module based on the size of a traditional *tatami* mat. As a result, whereas wall studs in the United States are located at 16 inches on center, wall posts in the post and beam system are located 910 mm (35.8 in.) on center. In addition, the actual size of a *tatami* differs depending on the region, influencing the size of the building module used in different regions. For example, *tatami* in the Kansai region (the region around Osaka and Kobe) generally measure 1010 mm by 1925 mm while in the Kanto region (the region around Tokyo) they measure 910 mm by 1820 mm. A third system (referred to as *Chiho-ma*) is used in the countryside. In addition, rough opening sizes are called out according to three different measurement methods: center of post to center of post, outside edge to outside edge, and inside edge to inside edge. To further complicate things, the wall posts used in post and beam houses come in several sizes (105 mm, 120 mm, 130 mm, or 150 mm). As a result, aluminum window manufacturers in Japan provide literally thousands of different sizes for the multitude of module variations that occur (Eastin et al. 2001b).

During our visits to construction sites it was noted that the majority of windows had not been sized to fit the rough opening between adjacent posts. Rather, the rough opening for windows was often framed in between the posts to accommodate the different window sizes (Fig. 3). Given this practice of in-fill framing for windows, it would be no more difficult for Japanese carpenters to frame in U.S. standard size windows than Japanese metric size windows, a fact that our discussions with Japanese builders and carpenters confirmed. However, the different post sizes used in post and beam construction means that the casing width used to frame out the window in the wall varies based on the size of post being used. To address this complication, Japanese carpenters usually rip the window casing from a wide

piece of casing on the jobsite after the window has been installed in the rough opening. In addition, Japanese windows generally have a wider extension outwards from the nail fins to take into account the additional thickness of the exterior wall that results from using the rain screen siding system (Eastin et al. 2001b).

Weatherproofing and flashing

Proper weatherproofing of windows is particularly important in Japan where typhoons and wind-driven rain provide the perfect opportunity for rainwater to penetrate into the cavity of a wall through improperly weatherproofed exterior wall openings. Another factor that contributes to this problem is related to the fact that, because houses are often three stories high and located close together in urban areas, roof eaves generally do not extend very far out from the side of the house. As a result, they are less effective in protecting the wall from falling rain. Lacking this protective feature, rain can hit the wall high up near the roof and flow down the side of the house as a sheet of water. As the water flows down the wall, hydrostatic pressure develops and this pressure can actually drive water into small openings around windows that have been improperly installed and/or weatherproofed (Cheney 2000).

In the past, Japanese architects and builders have located accent roofs over windows and doors as a method of directing the flow of water away from window openings. These accent roofs, which are called by a variety of names (including rooflets, accent roofs, window roofs, and window overhangs), extend approximately 6 inches beyond the window on either side. In this way, rain water flowing down the side of the house is directed away from the window opening, reducing the opportunity for water to penetrate into the wall cavity. In contrast, there is increased potential for water penetration when accent roofs are not used, particularly if the window is installed flush with the exterior wall.

Lack of technical support

While the major window manufacturers (principally aluminum window manufacturers) provide installation services, the majority of windows in Japan are installed by carpenters. This means that installation instructions must be clearly presented and translated into Japanese

to help ensure that the window is properly installed. Equally important are the instructions related to the installation of weather stripping materials both prior to and following the installation of the window. One of the most frequently cited problems with new construction by homeowners was related to water infiltration around windows. A second major complaint was related to the fact that windows became difficult to open and close after a period of time. Both of these complaints are related to poor installation techniques (Cheney 2000, Eastin et al. 2001b).

Ready availability of replacement windows and parts

While a window is a remarkably strong and durable product when installed in a house, they are subject to a wide variety of problems during transport. Since they have little control over the shipping and transportation process, window manufacturers should be prepared to deal quickly and effectively to settle warranty claims in Japan. Given the long lead times required to ship products by ocean freight and the relatively short response times required to settle a claim, many U.S. window manufacturers ship replacement parts and even entire window assemblies via air shipments. Not only is this expensive, but it is subject to the problems inherent in any transaction involving two languages and cultures. Thus, anecdotes abound of misunderstandings in parts specifications that resulted in the timely shipment of the wrong part. This can easily be avoided if a technical support person and an inventory of commonly requested replacement parts are established in Japan.

Lack of window maintenance and upkeep by homeowners

Another important fact to recognize is that Japanese homeowners rarely perform even the most basic maintenance on their homes, a fact that wood window manufacturers should especially be aware of. Since land values in Japan are several times higher than the cost of a house, most Japanese regard homes as a durable good rather than an investment asset. In fact, the lack of a secondary housing resale market in Japan only further exacerbates this problem. Given the critical importance of regular maintenance to the durability and performance of wood windows, particularly in a hot

and humid climate like Japan's, U.S. wood window manufacturers need to ensure that easy-to-read maintenance instructions (in Japanese) are delivered to the homeowner. This can be problematic since most maintenance materials are not saved by carpenters. Again, an in-country technical representative can work with builders to make sure that maintenance materials are delivered to the homeowners after they have moved into their new home.

Methods

To obtain primary information on the use and perceptions of U.S. wood windows by Japanese post and beam construction professionals, a short survey was developed. The survey was developed in collaboration with U.S. industry experts in Japan as well as with the cooperation of several U.S. wood window manufacturers. The survey was translated into Japanese and pre-tested by several builders and industry experts in Japan. The survey was administered to 87 Japanese construction professionals during a series of technical seminars held in Tokyo, Kitakyushu, Hiroshima, and Osaka related to the installation of U.S. wood windows in the Japanese post and beam construction system. In addition, we visited approximately 50 post and beam construction sites over the course of a 2-year period to evaluate window installation techniques, discuss problems associated with using U.S. wood windows in post and beam homes, and identify potential solutions.

Results

The survey participants were all Japanese post and beam construction professionals, 44.7 percent were builders, 20.7 percent were architects, 25.3 percent were building material distributors, and 9.2 percent were other specialties. Approximately 55 percent of the respondents indicated that they had used imported wood windows to some degree, with 19.5 percent reporting that they used imported windows exclusively and 11.5 percent reporting that they used domestic windows exclusively. The vast majority of respondents (69%) indicated that they used a mix of imported and domestic windows (both wood and non-wood).

Survey respondents were asked to indicate the importance of a range of factors when specifying or using imported windows (Fig. 4). While all of the factors were

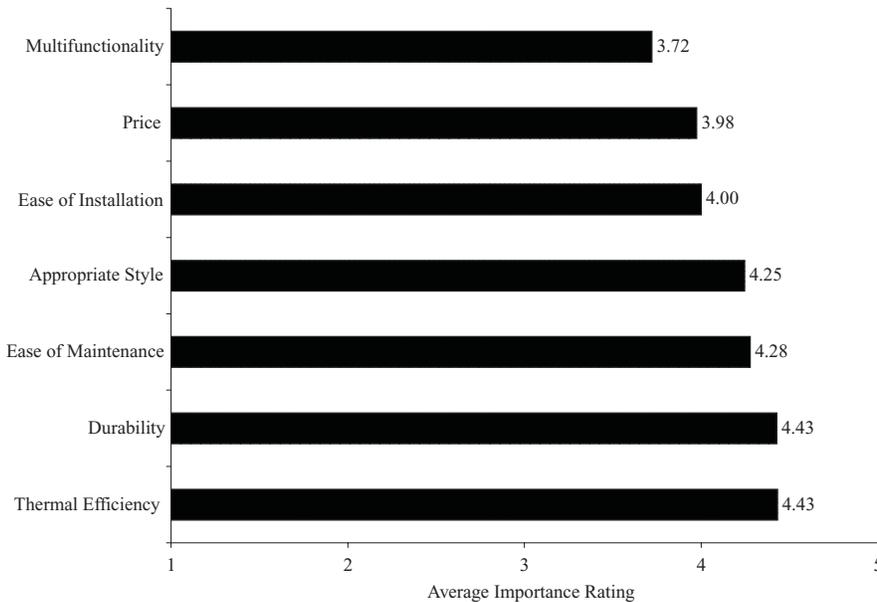


Figure 4. — Average importance ratings for U.S. wood windows in Japan.

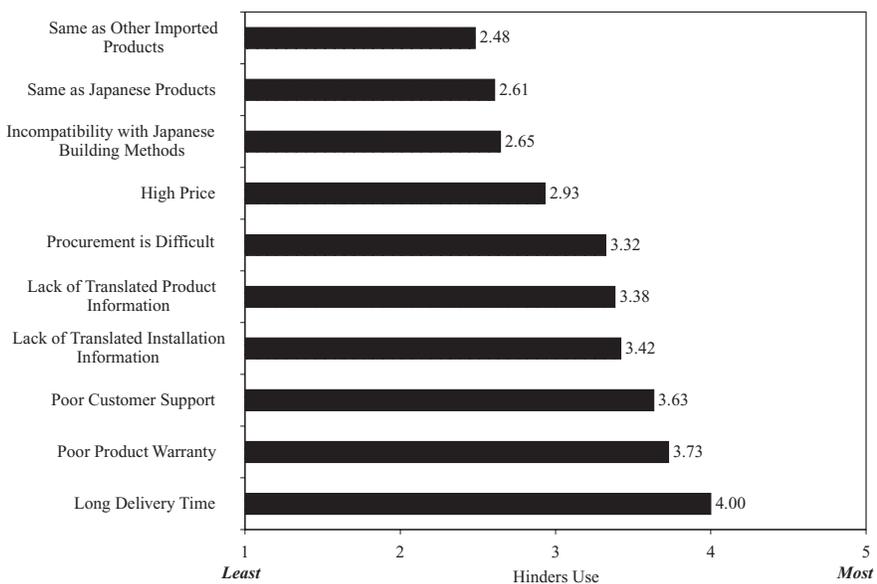


Figure 5. — Average ratings of factors that restrict the use of U.S. wood windows in Japanese post and beam houses.

rated above the mid-point of the importance scale, the two most important factors were thermal efficiency and durability. In contrast, the lowest-rated factors were multi-functionality and price. Interestingly, ease of installation was rated considerably lower than the highest-rated factors, suggesting that installation may not be as large a concern as

many U.S. and Japanese construction professionals had thought.

Survey respondents were then asked to indicate the degree to which a range of factors hindered their use or specification of imported windows (Fig. 5). The factors that were perceived as having the greatest negative impact can be segmented into two groups. The first

group, which included long delivery time, poor product warranty, and poor product support, can be loosely described as service-related factors. The second group of factors, which included lack of translated product information, lack of translated installation instructions, and difficulty in procuring imported windows, was related to the availability of information and products in Japan.

The survey respondents were invited to identify specific problems that they had encountered when using U.S. wood windows in post and beam houses. Just over a quarter of the survey respondents (24 out of 87) indicated that they had encountered a problem using U.S. wood windows. That group provided 65 specific comments, of which 27.6 percent were related to the performance of U.S. wood windows in Japan, while an additional 20.7 percent of the comments were related to problems encountered with installing U.S. wood windows into post and beam houses. Notably, almost three-quarters of the survey participants indicated that they had not encountered problems using U.S. wood windows in Japanese post and beam houses.

These survey results suggest that providing Japanese construction professionals with detailed, translated installation instructions is very important. More than a quarter of the respondents indicated that they encountered problems during the installation of U.S. wood windows in post and beam houses or subsequently with the performance of the windows. Follow-up discussions with Japanese construction professionals identified two reasons for these problems. First, they noted that not all U.S. window manufacturers provided detailed and translated installation instructions with their windows. In addition, U.S. window manufacturers did not always employ window technicians in Japan who could answer installation questions or provide technical advice to Japanese builders. As a result, the Japanese carpenters were left to develop their own installation procedure in situations where they were unsure about the proper installation technique for a window. Oftentimes we found that subsequent performance problems were directly attributable to the poor or incorrect installation of a window unit.

Conclusions

This research suggests that standard U.S. window sizes can be easily accommodated into the post and beam construction system used in Japan. However, product design and the range of services being offered have a substantial impact on the competitiveness of windows in Japan. The results of this research clearly suggest that U.S. wood window manufacturers should consider adopting the following strategies to increase the competitiveness of their products in Japan: 1) establish training and education programs for Japanese construction professionals; 2) produce and distribute a generic window installation manual in Japanese; 3) translate their product and installation information into Japanese; and 4) provide technical support and replacement parts for their windows in Japan. This research shows that with a well developed strategy, U.S. wood windows can be competitive in the Japanese post and beam construction sector.

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