

Housing Industry Enters "Age of Quality"

By Chiyoji Misawa

Housing in Japan underwent a qualitative change in and after 1975, with the "age of scarcity" giving way to the "age of discontent." In the "age of scarcity" housing suppliers were able to satisfy user needs as long as they met the basic performance requirements such as space, durability and livableness. In the "age of discontent," however, the needs themselves are diversifying, with people seeking homes equipped with new functions to make their lives more comfortable. The emphasis has clearly shifted from "quantity" to "quality."

It is difficult to effect such a qualitative improvement in housing through traditional techniques that depend largely on conventional carpentry. Effective responses to this changed housing demand can be made only through factory production techniques or technological innovations.

Some comment is in order at this point regarding the unique mode of housing acquisition in Japan. In the United States and West Europe, a home is traded along with the tract of land on which it is built. In Japan, home demand comes mostly from small landowners (in Tokyo's case, those who own about 165 m² on average). It is customary for these people to have their homes built on these lots according to their specific requirements.

Against this background, the development of factory production techniques has made it possible for the housing industry to rid itself of the conventional subcontract system and establish a new supply system based on a concept similar to that of manufacturing. As a result, it has become possible to introduce technological innovations into the housing industry.

Three factors contribute to cost reduction—1) technological innovations, 2) distribution rationalization and 3) mass production. More specifically, costs can be reduced by 30% through technological innovations, by 10% through distribution



Technological innovations, distribution rationalization and mass production contribute to cost reduction.

rationalization and by 10% through mass production. Factory production, or prefabrication, tends to be regarded as most effective in cost reduction. But in fact, research and development is the biggest contributor.

Revolution in new materials

Technological innovations are the development of new materials and new types of technology. New ceramics and silicon semiconductors are among the typical new materials that have been developed to date. Both materials are made from clay. If the 1950s-60s were the age of iron and the 1970s-80s are the age of oil, the 1980s-90s may be called "the age of clay."

New ceramics are inflammable because they are made from silica, the basic component of glass. They stand heat of up to 1,300°C and do not corrode because they are sintered. Corrosion resistance,

refractoriness and dimensional stability are some of their outstanding features, and because they are sintered while being expanded with air, they are also an excellent heat-insulating material. Moreover, they can be produced at low cost.

It requires ¥2 million (\$8,300) worth of wood to build a house. This can be cut to ¥50,000, or one-fortieth, if new ceramics are used. Transportation costs can also be reduced because the material is supplied domestically. A study shows that to build a house in Tokyo, trucks must travel an aggregate 120,000 km to transport the necessary materials. That is three and a half times the distance of the equator. Transportation accounts for an estimated one-third the cost of building a house.

By contrast, in the case of a house built with new ceramics like the Misawa Home 55, the transportation distance can be reduced to 300 km, or one-fourth the distance traveled when other materials are used. The raw material can be supplied from a site near a manufac-

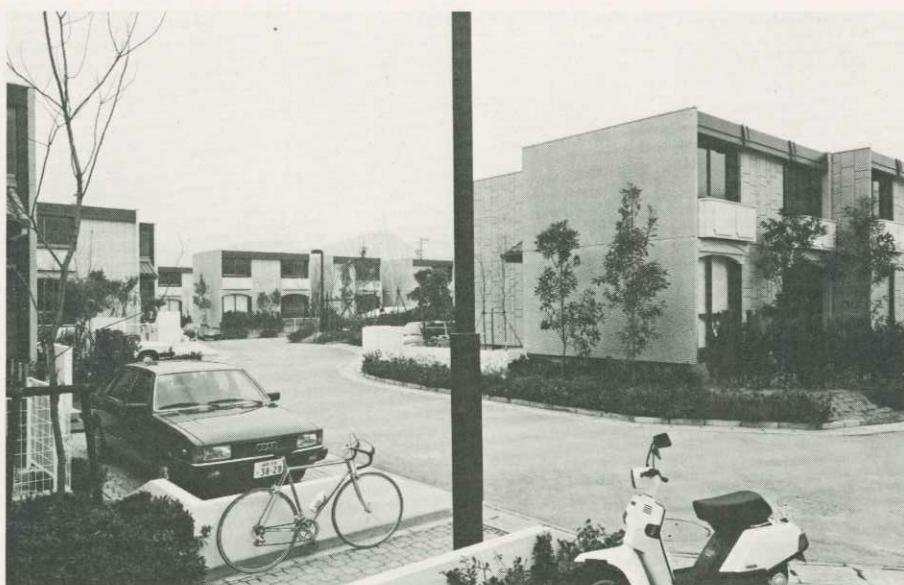
Chiyoji Misawa is president of Misawa Homes Ltd. An architect, Misawa established the prefabricated house construction company in 1967.

turing plant. Unitized forms of new ceramics are carried from there to construction sites. In addition, manpower can be reduced by transferring some of the on-site work to the factory. The time required on the site to build an ordinary house is 200,000 minutes (417 days) per man (assuming that he works eight hours a day). In the case of a wooden prefabricated house, the time can be reduced to 60,000 minutes (125 days) per man. With the Misawa Home 55, the time has been reduced to only 10,000 minutes (21 days). Labor costs in Japan are at about the same level as in the United States. Further cost reductions can be made through automation.

It is often pointed out that technological innovations do not reduce the cost of housing. The experience with the Misawa Home 55 shows, however, that the raw material cost has been cut to one-fortieth, the transportation cost to one-fortieth and the on-site labor cost to one-twentieth.

Substantial cost savings have also been achieved through the use of silicon. Five years ago it cost ¥50 million (\$208,000) to generate 3kw of electricity for household use. Use of amorphous silicon has made it possible to reduce the cost to ¥5 million (\$20,800). Our company expects to reduce it further to ¥500,000 (\$2,080). As a result, households will not have to buy electricity from a power company. Meanwhile, hot water can be supplied through geothermal energy.

My own house makes use of such underground steam. The company plans to sell, seven to eight years from now, "free-energy" houses where energy would be supplied on a self-sufficiency basis without any purchase of electricity, gas, water or oil. It is expected that new materials and technology will be used in houses built in the latter half of the 1980s, and that the mode of architecture will change considerably as a result.



A housing complex designed for the government-supported "House 55" project

National project — "House 55"

In parallel to the development of prefabricated home suppliers, the government in 1975 launched a "House 55" project designed to promote technological innovations in housing supply and develop a new housing supply system. This project was aimed, more specifically, at supplying houses with a floor space of 100m² at a price of ¥5 million (at 1975 prices), including a central heating system, beginning in 1980. It was envisioned as a major national project, under the joint sponsorship of the Ministry of International Trade and Industry (MITI) and the Ministry of Construction, and similar to the "Operation Breakthrough" project in the United States.

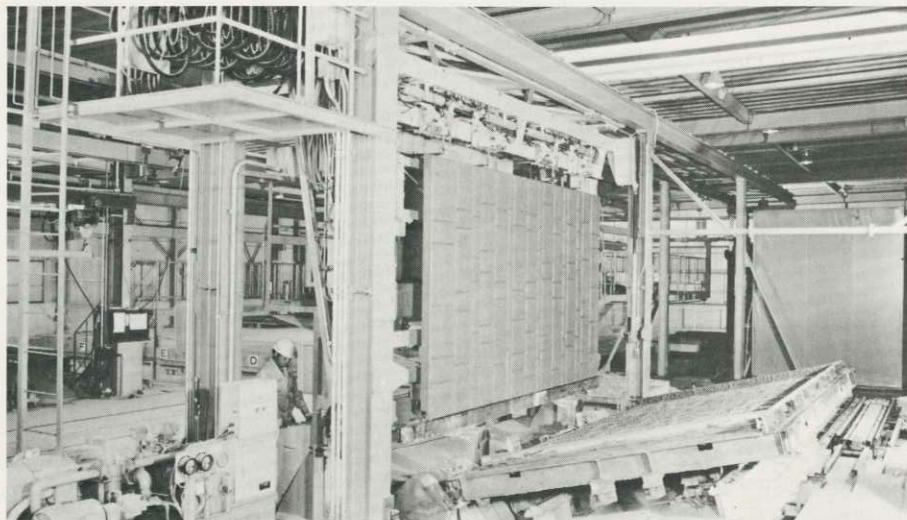
A total of 110 leading companies joined in the competition for suggestions. Misawa Homes Co. was the only company in the prefabricating industry to

win entry to the project. Misawa Home 55 was the first product the company unveiled in 1981, using new ceramics and the new technology called the "capsule construction process." The process consists of manufacturing housing units (rooms) at the factory and sending them out to construction sites for assembly. As such, the capsule process represents an important step in the development of factory production techniques in the housing industry.

MITI also launched a "New Housing Development Project" in 1975 in parallel with the House 55 project. The former is aimed at promoting technological development for housing in the light of the changing social and economic environment and increasing sophistication of people's needs. This project has the following specific development goals—1) housing using natural energy, 2) housing for the elderly and the handicapped to cope with the rapid aging of Japanese society, and 3) variable-space housing designed to meet changes in lifestyles and family composition. These "development themes" reflect MITI's thinking on the quality expected of Japanese housing in the future.

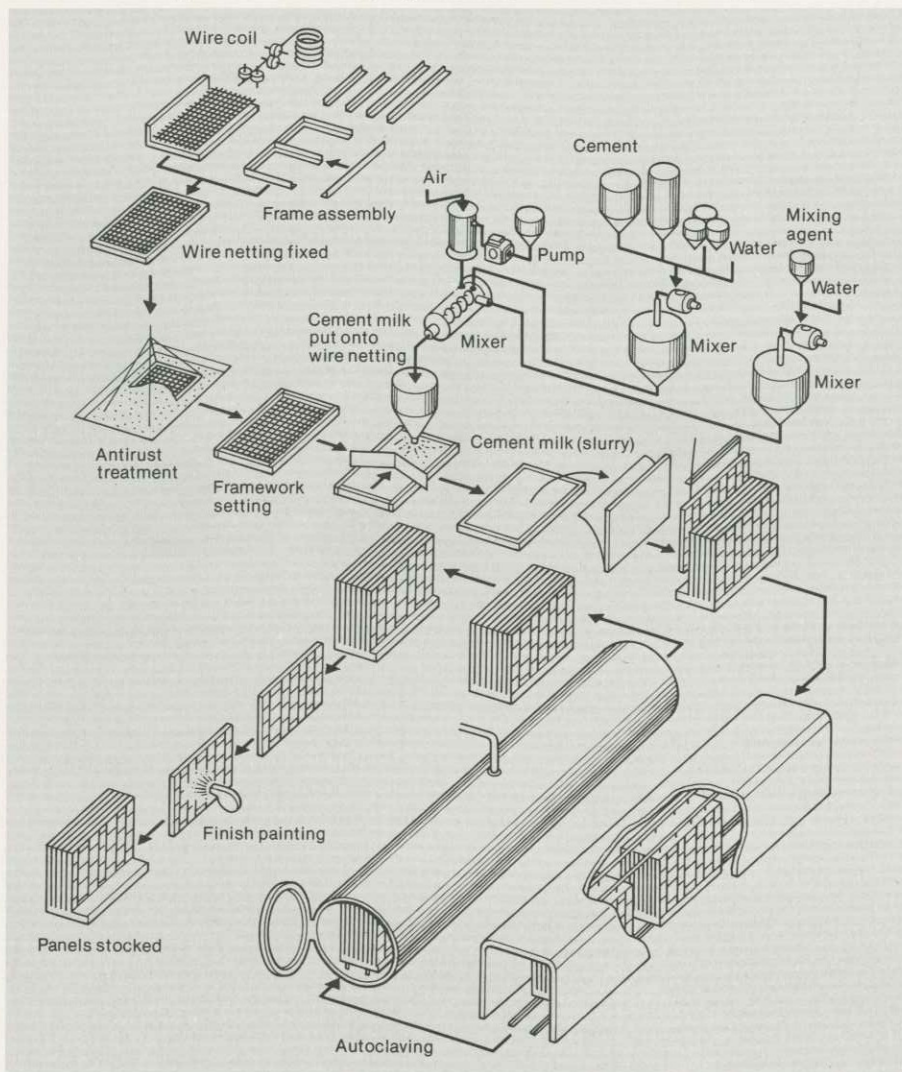
Prefabricated housing industry

The so-called prefabrication share—the number of prefabricated houses in the total number of housing starts (houses supplied through application of factory production techniques—they are completely different, as shown in the photo, from American mobile houses)—has continued to expand over the past several years. Although the number of annual housing starts in Japan has tended to decline from 1.5 million to 1.1 million, the



New ceramics are increasingly being used as a construction material.

Process of Making New Ceramics Housing Materials



prefabrication share increased from 9.0% in 1978 to 9.2% in 1979, 10.0% in 1980, 10.7% in 1981, and 12.1% in 1982.

In 1982, a total of 138,494 prefabricated houses were supplied, with steel-frame units accounting for 61.4% of the total. Japanese houses are traditionally made of wood, but this is not the case with prefabricated houses because technological innovations enabled steel-frame makers to enter the housing industry. Wooden prefabricated houses represented 22.1% of the total, and concrete prefabricated houses, 16.5%.

In fiscal 1982, Misawa Homes Co. ranked first in national sales of prefabricated houses (independent units), accounting for 25.9% (wooden material) of the total. Next comes Sekisui House Co. with 21.4% (steel-frame). The sales shares for other major suppliers were: 12.5% for Daiwa House Industry Co. (steel-frame), 10.3% for National House Industry Co. (steel-frame), and 9.1% for Sekisui Chemical Co. (steel-frame). These five companies accounted for about 80% of total sales of prefabricated houses

for that year. The number of houses sold per company ranged from 10,000 to 35,000. In other countries per-company sales rarely exceed 10,000 a year because houses are supplied mostly by regional firms.

The introduction of the manufacturing-industry approach to the housing industry has prompted suppliers to develop houses in much the same manner as merchandise. As a result, the cost of housing "hardware" has been reduced and the quality improved. Progress has also been made since 1975 in the development of "software," such as know-how on living requirements. As a result, the concept of "planned housing" has been created. This means that designers specializing in housing and researchers in various housing-related fields—for example, chromatic psychology, human engineering, geriatrics, interior design, acoustic engineering—incorporate their ideas into a commodity concept, or a new concept of housing as a commodity. The commodity-oriented supply of houses has been accompanied by the stepped-up develop-

ment of new commercial features for houses. In addition, marketing techniques for promoting sales of such houses have been effectively introduced.

Toward the 21st century

In 1982, the Industrial Structure Council, an advisory organ of MITI, discussed a long-term vision of the Japanese housing industry. It was proposed as a result of these discussions, attended by both government and private experts, that the concept of integrated parts supply should be introduced in order to meet residents' space needs. This concept held that parts should be grouped for each unit of living space and supplied in such groups. It was also suggested that the problem of housing should be reviewed in the context of education, regional culture, family, and community, because a house is the most important place of human activity. In other words, the vision stressed the need to create Japan's own "residential culture."

This proposal to create a better cultural environment in residential areas opened the way for a "residential culture campaign"—the first of its kind in the world—which was supported by MITI and other government agencies. It is natural that the availability of better quality housing through factory production should make residents more aware than before of the importance of utilizing their houses to their best advantage. Providing users with appropriate advice and suggestions on this point will be a major task for the prefabricated housing industry.

It is said that the housing industry has entered an "age of quality" in Japan as well as in other industrially developed countries. By "quality" this writer means that houses built now must be "usable" for 30 to 50 years, that is, in the 21st century. It does not mean durability in the traditional sense of the word; quality must be measured in terms of these questions: "What kind of world are we going to make in the 21st century? And how will housing change in that world?"

Misawa Homes Co. has proposed a "Quality 21 Program" that looks to the 21st century, listing 12 items of quality. Prefabrication is only one of the basic concepts of the housing industry, whose common goal is to supply housing of better quality. The introduction of mechatronics, new materials, biochemistry and the like is expected to raise productivity in a way that conventional technology has been unable to do. As a result, I believe the housing industry will make phenomenal progress. But a greater challenge for all of us in this trade is to develop the kind of new technology which takes into account non-technological factors such as humanism and natural beauty. ●