



Osaka Timber Association Building

Preserving forests and serving society: a more balanced approach to urban development

Takenaka Corporation's vision for the cities of tomorrow

Forests cover two-thirds of Japan's land area, yet today they are suffering. Forestry is in decline, and without proper forest management, trees and the undergrowth beneath can die off, leading to soil erosion, landslides, and other environmental problems. Without effective action, the beauty and bounty of Japan's mountains and nature will continue to be at risk.

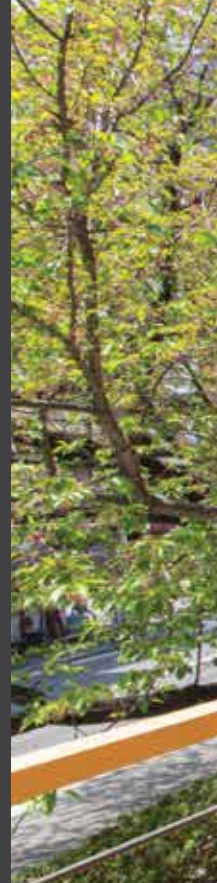
Takenaka Corporation takes this threat seriously, and as a company that has been involved in wooden architecture for over four centuries, it is deeply committed to the goal of achieving a sustainable society. To find out how the company is using its experience and technology to help preserve Japan's natural forests and build the cities of the future, we spoke with Hiroyuki Matsuzaki, Managing Director of Takenaka's Wooden Architecture Promotion Department.





Left: Hiroyuki Matsuzaki
Managing Director
Wooden Architecture
Promotion Department

Right: Osaka Timber
Association Building



Takenaka's "Grand Cycle" for forest preservation and urban development

Takenaka traces its origins to 1610, and we have been involved in the design and construction of wooden structures for over 400 years. So we are understandably concerned about the current state of Japan's forests and forestry industry, and we want to assist local communities that currently face forestry issues. Our "Grand Cycle"* initiative was conceived to help us achieve these goals — to revitalize the nation's forests and forestry industry by boosting demand for large-scale wooden construction projects in urban areas. Linking forests and urban communities, we want to integrate forests and forestry resources into people's lives in a dynamic way.

In addition, we also have the larger goal of cutting CO₂ emissions to address global warming and achieve a sustainable society. That is why we want to encourage the use of wood, since it is a recyclable resource whose responsible use can actually help to reduce CO₂ emissions. Wooden architecture has garnered increased attention in recent years, with more wooden buildings being constructed in Europe and other places around the world. At Takenaka — based in Japan where two-thirds of the land is covered in forest — we strive to be a leading wooden architecture company.

Sharing the wonder of wood with cities and generations to come

As a construction material, wood boasts excellent insulating and humidity-buffering properties. Perhaps even more importantly, the natural warmth and feel of wood can have a positive effect on people, and even be beneficial to human health. At Takenaka, it is our wish to bring all the goodness of wood to places where people come together. One example of this is Ariakenishi Gakuen, a school we are currently building in Tokyo's Koto Ward. We believe that if children are

exposed to the warmth of wood at an early age, they will naturally come to love wooden buildings and nature in general, and grow up to become kinder, more sensitive adults.

Bringing the benefits of wood to urban environments

Moen-Wood

One of the products we developed to apply the benefits of wood to urban construction is Moen-Wood, a type of fire-resistant laminated lumber that takes its name from a colloquial form of the Japanese word *moenai*, which means, "does not burn." It is made from larch, cedar, and cypress harvested from forests throughout Japan, and is composed of a load-bearing central core of laminated wood surrounded by stop-layer mortar and a self-charring surface layer of laminated wood that is designed to carbonize in the event of a fire, effectively insulating the load-bearing core from heat. As a result, Moen-Wood has earned Ministry of Land, Infrastructure, Transport and Tourism certification for one hour of fire resistance as stipulated under the Building Standards Act, enabling it to be used to construct the top four floors of any building.

As of July 2017, six fire-resistant wooden buildings have been built with Moen-Wood. The first was the Osaka Timber Association Building, which was completed in 2013. Currently used as an office building, it features Moen-Wood columns and beams, and an abundance of wood in walls and floors. Although it has been four years since this warm, comfortable building was constructed, one can still smell the pleasant aroma of wood upon entering.

Shinkashiwa Clinic, a dialysis clinic in Kashiwa City, Chiba, was built in 2016. By using Moen-Wood columns and beams to construct the dialysis rooms, we were able to create a spacious and comfortable environment that has been praised by patients and staff for its



relaxing atmosphere and ability to alleviate the stress that many patients experience during treatment.

T-FoRest Series

Another of our technologies is earthquake-resistance. Retrofitting existing buildings for earthquake resistance generally requires the incorporation of a steel frame brace. T-FoRest Light is an alternative technology that uses wood instead of steel, resulting in a more aesthetically pleasing appearance. T-FoRest wall components provide a level of strength nearly equal to ferroconcrete earthquake-resistant walls, and can be retrofitted to existing buildings to provide the dual advantages of earthquake resistance and a warm, comfortable atmosphere.

Both Moen-Wood and the T-FoRest series have been widely acclaimed and earned numerous awards, including the Global Environmental Forum's prestigious Eco Products Award.

Open standards to promote faster, broader adoption

To speed adoption of advanced wooden construction technologies, we are proposing an open standard for Moen-Wood and T-FoRest series products. We believe Moen-Wood technology can be improved even more, and intend to share information on further advances and other newly developed technologies to help spread their adoption worldwide.

Exploring wood's potential: a new vision for the future

Moen-Wood has already been certified capable of withstanding flame for a period of one hour, and we are working to achieve the two-hour mark within this year. Once certified at the two-hour level, it will be possible to create structures of up to fourteen stories, greatly expanding the range of wooden buildings that



The AT-Group Head Office, North Building, built using Moen-Wood columns and beams.

can be built to meet the needs of our increasingly urbanized world.

But there are still many issues that need to be addressed. Large-scale wooden architecture differs from steel and concrete architecture in many ways, and requires special technologies to ensure the integrity of joints and other components. We therefore need to develop new methods of calculation and assessment for each specific joint connection methodology and the metals employed. These are significant architectural challenges, and are one of the reasons for the relatively slow rate at which large-scale wooden buildings are being constructed. That is why it is essential that we collaborate and license technologies on a global scale, and ensure that these initiatives are linked to global warming countermeasures and CO₂ reduction.

The economic viability of large-scale wooden architecture also demands a reexamination of our wood material supply chain, including what types of wood are used and where and how they are harvested. Without engagement in the material production process, large-scale wooden architecture is an impossibility. The current supply chain is essentially a system designed to serve residential architecture, so in order to achieve the goal of large-scale wooden architecture, we must address the issue of cost, and develop a new supply chain to meet our needs.

New methods require new ways of thinking

Wood is a natural material, and is subject to the effects of the environment in which it is used. Although there are some temples and shrines in Japan that have survived for over a thousand years, this is primarily due to the regular maintenance they have received. In today's world, however, market forces demand that buildings be as maintenance-free as possible. Although wood offers unique advantages with respect to vibration and sound insulation, buildings constructed of wood must also offer their occupants a high level of safety and peace of mind. To make large-scale wooden architecture a reality — and to create a truly sustainable society for the future — manufacturers and customers must both develop a new mindset, and think about issues such as maintenance and habitability in new ways. At Takenaka, we continually strive to reassess our way of thinking, and to communicate our ideas to the public we serve.

** Takenaka's "Grand Cycle" initiative takes its name from the original forestry cycle of plant-grow-harvest-use, as well as the larger resource and economic cycle that links the forestry industry, regional revitalization, community building, and construction.*



Above: The Shinkashiwa Clinic is just one example of the large-scale wooden buildings that can be constructed using Moen-Wood columns and beams.

Below: Moen-Wood columns and beams create a spacious and comfortable environment for dialysis patients at the Shinkashiwa Clinic.



Below left: Moen-Wood is composed of a load-bearing central core of laminated wood surrounded by stop-layer mortar and a self-charring surface layer of laminated wood.

Below right: Special technologies are used for joints to ensure high structural integrity.



THE WALL STREET JOURNAL.

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