

The Current Principles for the Preservation of Historic Wooden Monuments in Japan

Alejandro Martínez

1. The Development and Current Practice for the Conservation of Wooden Monuments in Japan

Timber remained the main construction material in Japan until the modern era, and together with building techniques, repair techniques developed through centuries. The climatic conditions in Japan, with mild temperatures, large rainfall and high humidity are ideal for wood attacking insects and fungi. In addition, Japan is prone to natural disasters such as earthquakes and typhoons. Nevertheless, ancient timber structures were kept and maintained through periodic repair and maintenance, and timber structures as much as 1300 years old are still standing in Japan today.



Fig.1 Main Hall of Todaiji Temple, condition before the repair works in 1891.



Fig.2 Japanese carpenters at work, Kasuga Gongen Kenki, 1309.

Traditionally, carpenters repaired the structures by replacing rotten or damaged timbers by new ones. Partially damaged members were often reshaped and reused in a different position. In the case of large section members, the damaged part would be cut out and spliced with new wood without substituting the whole element. Pillar bottoms, which are vulnerable to rot because of humidity, were commonly repaired this way. When the extent of the damage required it (approximately every 150-300 years), a major repair through partial dismantlement and reassembly was carried out, especially in the roof structure. The Japanese building system, based on posts and beams joined with woodwork joints, allows for a relatively easy dismantlement with minimal loss of material. Complete dismantlement of buildings to transport the parts and reassembly them in a different location was also a common practice. However, even after going through several repairs, since the damage to the building is usually localized in the roof, eaves, pillar bottoms and outside members, in many cases most of the main structural members remained original throughout the centuries.

The first law for the protection of cultural heritage buildings in Japan was enacted in 1897. From then, ancient wooden structures were conserved as national monuments. The figure of the conservation architect appeared, and started to play a significant role in combination with that of the master carpenter. The result was the development of a new approach to the repair of ancient buildings. The Japanese method for the preservation of wooden monuments further evolved throughout the 20th century to become a highly specialized operation with a scientific and systematic approach.

The main features of the current methodology for the conservation of wooden monuments in Japan are:

- a) Respect for the original material. In the repair of timber structures, as much as possible of the old

material is reused. Damaged members are repaired by splicing decayed parts with new timber. Small section timbers and heavily damaged elements, which traditionally would be replaced, are also repaired through this method, and complete replacement is limited to extremely damaged members. This kind of repair is possible thanks to specialized carpentry techniques, used in combination with modern technologies such as epoxy resins. In addition, elements that had to be replaced are stored if they have documental value, and discarded timbers are usually stored in the roof.

b) Preference for traditional techniques. Priority is given to repairs through traditional tools and techniques; and any new members or parts of members are dressed using tools and techniques that match the original ones.

c) Thorough research and survey of the structure. During the repair work, a careful survey of the traces left on the wooden members, such as nail holes, carpenter's marks, traces of previous joints, and traces left by dressing tools, is carried out by the conservation architect. This allows to identify the building tools and techniques that were originally used, the original design and subsequent alternations, and the construction history of the building.

d) Systematic documentation. Starting from 1930, a thorough report including measured drawings, photographs, the result of the research and survey, and a detailed description of the works that had been carried out is published. The reports follow a standardized format, and the budget for writing and publishing them is included in the overall repair budget. 300 copies of each report are distributed to all major public libraries and universities, and made available to researchers and the general public. Up to date, over 2000 of these reports have been published.

The type of repair which is carried out is determined by the extent of damage. In buildings where the roofing is made of vegetal materials, such as thatch and cypress bark, a reroofing must be carried out every 20-30 years. When the damage is extended to the eaves and outside elements a partial repair of the decayed members is carried out. Sometimes partial repairs require jacking up the whole structure in order to replace decayed pillar bottoms or reinforce the foundation. If the damage affects most of the roof structure, a

partial dismantling is carried out in order to repair and replace the decayed elements. If the extent of the damage is generalized, affecting main structural members, and compromising the structural safety of the building, a thorough repair through complete dismantling and reassembly is carried out. In the case of repairs through partial or complete dismantling, the high difficulty of the operations requires the conservation architect to work permanently on site, establishing a temporary office next to the repaired building for the duration of the works and following closely the whole process. Conservation architects and carpenters receive a specific training and are licensed by the government.

2. The 1999 Principles for the Conservation of Historic Timber Structures and the Japanese Practice

The first proposal of the 1999 Principles for the Conservation of Historic Timber Structures was drafted by the then president of the ICOMOS International Wood Committee Nils Marstein and secretary general Knut Einar Larsen in January 1994. Written a few months before the Nara Document on Authenticity, their proposal is an inclusive document that shows deep recognition for the concept of cultural diversity.



Fig.3 The members of the ICOMOS Wood Committee having tea during the Himeji meeting, May 1994. In the center, Dr. Ito Nobuo (left) and Dr. Knut Einar Larsen (right). (Photo provided by Dr. Knut Einar Larsen).



Fig.4 Different kinds of repairs of rafters made by splicing damaged timber with new wood, Rin'oji Temple, 2015. The date of the repair is burnt into the new.

At the invitation of Nobuo Ito, Japanese member of the IIBC, Larsen had spent one year (1989-1990) in Japan studying the Japanese conservation method of wooden structures. The results of this study were published under the title *Architectural Preservation in Japan* (1994).

Although the 1999 charter was based on several previous documents, many of the principles included in it match those of the standard Japanese practice. It is possible to infer that, through Larsen's and Ito's work, the Japanese conservation method had a significant influence in the writing of this document.

This influence is especially notorious regarding the preference for traditional repair methodologies. Article 9 prescribes that *"If a part of a member is replaced, traditional woodwork joints should, if appropriate and compatible with structural requirements, be used to splice the new and the existing part."* This is also the standard in Japanese conservation practice, where while modern repair technologies such as epoxy resins, carbon fibers and steel reinforcements are also employed, splicing damaged members with new timber through traditional carpentry techniques remains the main method of repair. The new timber employed in the repair meets the requirement of the charter of *"being made of the same species of wood with the same, or, if appropriate, with better, grading as in the members being replaced."*

The recommendation that *"craftsmanship and construction technology, including the use of dressing tools or machinery, should, where possible, correspond with those used originally"* is also followed in the Japanese methodology. A careful research of traces present in old wooden

members allows identifying the tools and techniques that were originally employed, and new timber elements introduced in the repair work are dressed in the same way as originally. In certain cases, research has allowed to recover tools and techniques that were in disuse and almost completely lost. An example of recovered technique in Japan is the spear-plane *yarigan-na*. This kind of plane, with a leaf-shaped blade mounted on a shaft, fell out of use after the medieval era when it was substituted by the base-mounted plane. However, during the repair of Horyu-ji in the second half of the 20th century, the tool and the planning technique were recovered through the examination of traces left in old members and the study of documents depicting its use. Similar results have been achieved also in Norway, where the northern European *sprett-telgging* technique used until the 14th century to finish the surface of exposed logs with an adze was revived in the 1990s after being lost for centuries, through research of old wooden members and tools and similar techniques in Russia. These discoveries have a scientific and cultural value of their own, and contribute to enrich our understanding of wooden architectural heritage.

The Japanese repair method also follows the recommendation that *"nails and other secondary materials should, where appropriate, duplicate the originals."* Japanese traditional wrought iron nails' appearance and behavior is different from that of modern wire nails. Although their cost is much higher, traditional handmade wrought iron nails are often employed in conservation work, especially in parts of the building where they are going to remain seen.

The recommendation in article 10 that *"appropriate traditional or well-tested modern methods may be used to match the colouring of the old and the new with due regard that this will not harm or degrade the surface of the wooden member"* is also part of the Japanese standard practice. In Japan, this practice dates back to the pre-modern era, when new timbers used in tea rooms were colored to match with older materials. In current conservation practice, new timbers are colored if they are going to remain seen in order to harmonize then with the rest of the structure.

In addition, article 11, which advises that *"new members or parts of members should be discretely marked, by carving, by marks burnt into the wood or by other methods, so*

that they can be identified later” also matches the standard Japanese practice, where new elements are identified with a mark burnt into the wood with the date of the repair.

3. Traditional Techniques in the Conservation of Wooden Buildings

The described repair methodology is possible in Japan only because of the survival of the traditional knowledge regarding building techniques.

Modern construction materials like brick, steel and reinforced concrete were introduced in Japan during the late 19th and early 20th century and played an increasingly significant role in Japanese architecture. However, a significant difference between Japan and some Western countries is that in Japan modern building technology never completely substituted traditional architecture. Throughout the 20th century, western style architecture coexisted side-to-side with Japanese architecture, and even today, Japanese style architecture built with traditional carpentry techniques is preferred in the case of temples and shrines. Therefore, in Japan, traditional building design and architecture is not a revival nor an imitation, but a true form of contemporary architecture in its own right.



Fig.5 Enkyoji Maniden, a wooden temple built in 1933.



Fig.5 Training young carpenters in the use of traditional tools.

This fact has also an impact in the approach to architectural conservation. In western countries, a deeply rooted principle is that interventions in historical buildings should “bear a contemporary stamp”. However, in Japan, carpentry and other traditional building techniques are also “contemporary”, in the sense that they are alive and have continued almost uninterruptedly from the pre-modern era.

Nevertheless, the demand for this kind of techniques is limited to religious architecture, few examples of residential architecture, and conservation work. The number of skilled craftsmen is decreasing also in Japan and measures must be taken to ensure the passing on of their knowledge.

The legal framework of “Selected Conservation Techniques” was introduced in Japan through the 1975 amendment of the Law for the Protection of Cultural Properties. Through this system, techniques that are considered necessary for the preservation of Cultural Properties are selected, and the individuals and organizations that hold them are certified by the government as custodians of these techniques. Selected techniques related to the preservation of wooden architecture include carpentry, different roofing techniques (thatch, tiles, cypress bark), plastering, traditional painting and lacquering, and metalworking. In addition, design techniques such as the traditional kiku technique, and techniques for the elaboration of tools and the harvesting of raw materials such as cypress bark or raw lacquer are also selected. A total of 71 Conservation Techniques are selected; 57 individuals and 31 organizations are certified as custodians (as of July, 2014). Custodian

organizations hold training courses with governmental subsidies, and individuals receive annual subsidies for training and handing on of their techniques. "Architectural conservation", i.e. the specialized knowledge that is required of conservation architects to perform their work, is also included as one of these techniques, and training programs are centralized and carried out with governmental support.

Protecting the architectural heritage means not only conserving historic buildings, but also keeping the technical knowledge that made possible to build, maintain and repair them, especially in the few regions where this knowledge has not already been lost. Recognizing the cultural value of this knowledge and taking steps for its preservation is a task of the utmost urgency.