Patrick Moore

Stereotomy and L'Art du Trait*: The* Guitarde *as a Case Study*

Estereotomía y L'Art du Trait*: La* guitarde *como caso de estudio*

A estereotomia e a L'Art du Trait*: A* guitarde *como caso de estudo*

Abstract | Resumen | Resumo

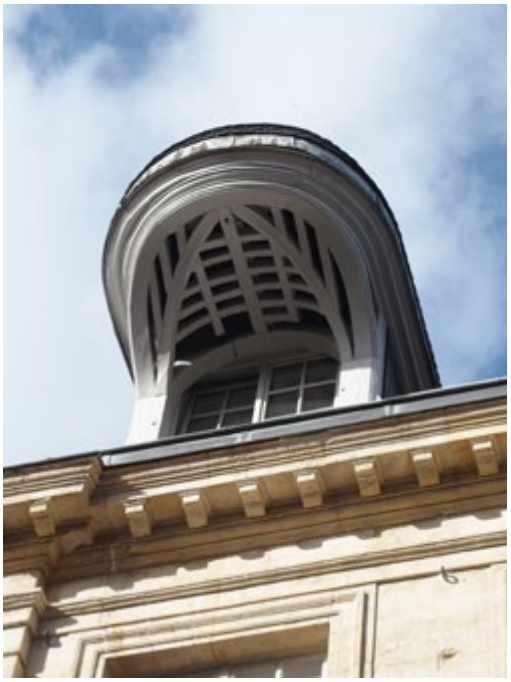
One example of the combination of structurally sound construction techniques and attention to pleasing aesthetics can be seen in the *guitarde*, an elaborate type of dormer that was developed in the Loire Valley in France during the eighteenth century. Although the traditional methods of joinery are still taught and practiced, their use in contemporary *guitardes* is uncommon. Historic preservation work and the insights provided by the construction practices employed in buildings being preserved may give us a new perspective, providing a more holistic and profound approach to sustainable architecture than is allowed by an exclusive reliance on new technologies.

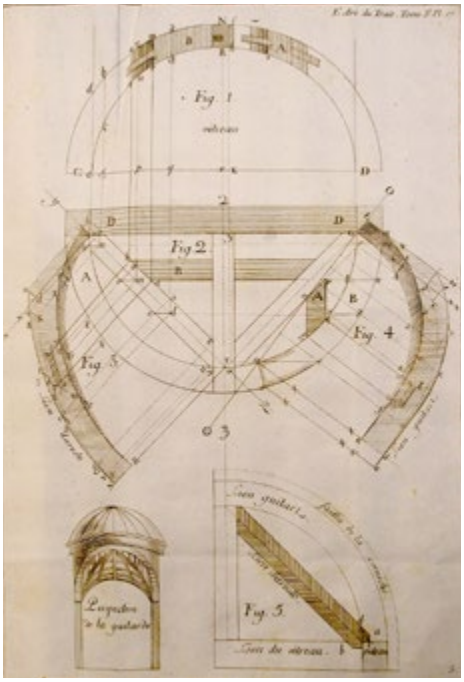
Un ejemplo de combinación de técnicas de construcción estructuralmente sensatas y atención a los detalles estéticos es el de la *guitarde*, un tipo de ventana abuhardillada decorada que se desarrolló en la región francesa del Valle del Loira durante el siglo XVIII. Aunque los métodos tradicionales de carpintería se siguen enseñando y practicando, su aplicación a las *guitardes* contemporáneas es poco frecuente. El trabajo de conservación del patrimonio histórico y la información que ofrecen los métodos de construcción utilizados en los edificios conservados pueden darnos una nueva perspectiva que proporcione un enfoque más integral y profundo de la arquitectura sostenible frente a la dependencia exclusiva de las nuevas tecnologías.

Um exemplo da combinação de técnicas de construção estruturalmente sólidas com a atenção à estética agradável pode ser visto na guitarde, um tipo elaborado de trapeira que foi desenvolvido no Vale do Loire, em França, durante o século XVIII. Embora os métodos tradicionais de ensambladura ainda sejam ensinados e praticados, a sua utilização nas guitarde contemporâneas é pouco comum. O trabalho de preservação histórica e os conhecimentos proporcionados pelas práticas de construção utilizadas nos edifícios a preservar, podem dar-nos uma nova perspetiva, proporcionando uma abordagem mais holística e profunda à arquitetura sustentável do que é permitido por uma dependência exclusiva das novas tecnologias.

Today, as our society faces pressing challenges with respect to environmental sustainability, one approach to more sustainable building in the future is to be found in the field of historic preservation. The conservation of historic buildings reveals the structural integrity with which they were often built, as buildings that have already lasted for centuries could not have done so without sound principles of design and construction. Their combination of functionality and timeless beauty provide insights of value as we attempt to adopt more sustainable ways of building. The craftsmanship involved in their construction also illustrates not only the skill of the craftspeople involved but also an intellectual approach different from and often more profound than that which we frequently see today.

One example of this combination of structurally sound construction techniques and attention to pleasing aesthetics is the *guitarde*, an elaborate type of dormer developed in the Loire Valley in France during the eighteenth century. Dormers became popular as they enabled the creation of an additional story of fully lit rooms above a building's eave line. The earliest dormers were functional and simple, but architects later integrated them into their designs, using them to emphasize vertical





These two *guitardes* by Nicolas Fourneau, author of the *L'art du trait de charpenterie*, for Hôtel du Président de Bailleul, Rouen, were made shortly before the publication of his treatise in 1767. They can be found at 5 rue du Moulinet, Rouen, Normandy (Andy Hyde)

1: Designed and built by Arnaud Delaunay in order to qualify as a Compagnon du devoir during his Tour de France while in Lamothe-Landerron, Aquitaine, the creation of this extra-large *guitarde* shelter took more than 740 man-hours (Arnaud Delaunay)

2: Two elliptical *guitardes*, with a balcony (below) and supporting an ogee roof (above), to be found at Musée des Compagnons du Tour de France, 14 rue Tripière in Toulouse (Michel Ravitsky)

and horizontal lines of symmetry and framing windows with pediments and other detailing. Some of these dormers were referred to as *guitardes* because their curving lines resemble the shape of a guitar. The first documented example of such elaborate dormers in timber is a pair of *guitardes* designed and built in 1765 by Nicolas Fourneau, a master carpenter from Rouen in Normandy. Interestingly, much traditional *guitarde* joinery is simpler than its overall form might suggest. For example, Louis Mazerolle's 1866 treatise *Traité Théorique et Pratique de Charpente* details a highly complex *guitarde* joined primarily with variations on standard mortise-and-tenon and half-lap joints.

The *lucarne guitarde* and its slightly less complex cousin, the *lucarne capucine*, became a mark of quality and craftsmanship in carpentry. Throughout the nineteenth century, clients and architects wishing to hire the best craftspeople would commission elaborate dormers to be built on their roofs, and carpenters, in a spirit of competition, would build increasingly complex exemplars to advertise their skill. These structures are admired by professionals as well as the public, and some are regarded as masterpieces.

A *guitarde* is a composition of interlacing, double-curved pieces with curvilinear (typically circular or elliptical) profiles in plan view and in both front and side elevation views. A related dormer type, the *capucine*, is often confused with the *guitarde*. The difference is that, in plan, *capucines* are rectilinear, whereas *guitardes* are curvilinear, though the internal components of both are double curved. "*Capucine*" comes from the French *capuche*, meaning "hood", for the similarity to the hooded robes of Capuchin monks. Both *capucines* and *guitardes* are used as structural supports for a range of cantilevered roof features, including dormers, balconies, or porch roofs, and as canopies above entryways, alcoves, and statuary niches.

In plan view, the circular or elliptical circumference of a *guitarde* is often defined by a solid wood cornice, commonly adorned with detailed moldings, below the upper roof structure. This cornice is supported by two flanking, double-curved braces known as *guitarde* braces. The spandrels, or triangular spaces, created between the cornice and braces are often filled with curved paneling with decorative motifs. The space between the *guitarde* braces is filled with numerous double-curved pieces. Principal among these are *liens de tenailles* (pincer links), which in part are hips and valleys

Hippolyte Moreau was a master carpenter in Châteauroux, and made these dormers in 1871 on his family house at the corner of 12/14 rue de la Gare and rue Ledru Rollin, Châteauroux. They reflect all the challenges of his trade and all his knowledge of stereotomy (Geomotifs)

at the intersection of the curved front and side elevation profiles, often taking the form of irregular groin vaults. Pincer links are essentially curved Saint Andrew's crosses that resemble a curule seat, a Roman chair style that symbolized political or military power. Note that Fourneau's *guitardes* have hips that are straight in plan rather than pincer links, indicating that the radii and elevation of the front and side profiles are identical. Also in this space, often between the interlaced timbers, we find letters referring to Compagnon craftsmen, dates, initials, and diverse motifs, such as stars, crosses, and flowers.

Fourneau wrote the first French treatise on carpentry stereotomy by a working craftsman, *L'art du trait de charpenterie*, published in 1767 and including working drawings of early *lucarnes guitardes*. Fourneau's treatise was the culmination of nearly twenty years of teaching the techniques of complex stereotomical carpentry to his fellow guildsmen. It was the first compilation of techniques that until

The façade of the Aux Arts et Sciences réunis restaurant at 161 avenue Jean Jaurès in Paris features a small *guitarde* canopy with a double-curved surface that has been sectioned on an angle to create two double-curved hips and a straight valley in the center (Sim Ayers)

then had been the domain of individual master carpenters, each with his own favored methods. By repeatedly setting out problems and testing solutions with his students, Fourneau arrived at a set of techniques and procedures that could be formally taught rather than simply practiced on worksites where apprentices and journeymen would learn from a master.

Stereotomy, as the application of complex geometry to building methods is known, in the French tradition is commonly referred to as *l'art du trait*. This term, roughly translatable as "the art of the line," was first used by the Compagnons du devoir, the ancient French craft guild system whose origins likely predate the twelfth century. Similar notions exist in Germany (*Schiften*) and in Japan (*Kikujutsu*). As an art and a set of techniques, stereotomy reflects empirical knowledge that

Masterpiece of carpentry at the Compagnons du devoir guild house in Saumur (Tim Whitehouse)

House and *guitarde* built by the master carpenter Albert Fisseau in 1947. Fisseau "Tourangeau l'Ami du Trait" qualified as a Compagnon du devoir in Tours in 1959 (David Poiron)

developed into an intellectual discipline. As a method of cultivating independent problem-solving, stereotomy is relevant on any worksite. As of 2009 *l'art du trait* has been listed on the Representative List of the Intangible Cultural Heritage of Humanity.

For eight centuries *l'art du trait* has been used in France to determine and express the values of structural details through precise working drawings. With this method a carpenter or stone carver can determine all the dimensions and angles required, prior to layout or assembly of components. This was originally done with full-size working drawings, often drawn on the floor. With the evolution of technology the method was developed to include the use of scaled-down drawings.

Masterpiece of carpentry at the Compagnons du devoir guild house in Toulouse (Jonathan Lahaye)

Canopy built by Nathaniel Gruenwald for which he was awarded an Advanced Professional Certificate by the Professional School of Stereotomy. The porch consists of a groin vault formed by two *capucines* based on Billon Frères plate 89, published in *L'art du trait de charpenterie* (Nathaniel Gruenwald)

Although the traditional methods of joinery are still taught and practiced, their use in contemporary *guitardes* is uncommon. Modern mechanical fasteners and glues and techniques such as glue lamination can speed up manufacture and produce highly stable structures. But the enduring legacy of manual stereotomy is its intellectual orientation – the way of seeing and conceptualizing design and construction that it involves.

In *The Artisans and Guilds of France*, François Icher sums up the experience of *l'art du trait*: "For centuries, youngsters on the Tour de France [an itinerant apprenticeship for craftspeople] have been initiated into the mysteries of the *trait* in courses given by journeyman teachers who are past masters in its subtleties. In fact the working drawings used in realizing masterpieces of carpentry are just as remarkable as the artifacts themselves … The *trait* transforms the work as well as the worker. With the support and supervision of his teacher, the student thinks, reflects, and learns to envision differently."

Historic preservation work and the insights provided by the construction practices employed in buildings being preserved may give us a new perspective, providing a more holistic and profound approach to sustainable architecture than is allowed by an exclusive reliance on new technologies. Surprisingly to some, exposure to these time-tested techniques clearly assists the practice of sustainable building and shows that future sustainable practices would be enriched by the incorporation of old wisdom.

A complex *guitarde* above the entrance to the Compagnons du devoir guild house in Mont-Saint-Aignan near Rouen (Hans-Peter Koennecke)

Masterly classic *guitarde* constructed by two students, Jérémie Abbatte and Luc Adam, at the Professional School of Practical Stereotomy, Ottawa, respecting all the rules of the art, and the first ever built in the Americas. The *guitarde* and roof structure combined represent more than 1500 man-hours (The Professional School of Practical Stereotomy)

References | Referencias | Referências

Fourneau, Nicolas. 1757. *L'Art du Trait de Charpenterie*. Rouen: Firmin Didot.

Icher, Francois. 2000. *The Artisans and Guilds of France: Beautiful Craftsmanship Through the Centuries*. Michigan: Harry N. Abrams.

Mazerolle, Louis. 1866. T*raite Theorique et Pratique de Charpente*. Dourdan: Éditions Vial.

UNESCO. 2009. Scribing tradition in French timber framing. *Intangible Cultural Heritage*. https://ich.unesco.org/en/RL/scribing-tradition-in-french-timber-framing-00251?RL=00251 (consulted on 20/08/2022).

Biography | Biografía | Biografia

Patrick Moore

Patrick is the first North American to have become a fully inducted member of the Compagnons du devoir, having spent several years in France doing the Tour de France and participated in the restoration of two UNESCO World Heritage Sites and many *Monuments Historiques* such as the National Opera House in Strasbourg and the Château du Haut-Koenigsbourg in Orschwiller, Alsace. Patrick has two diplomas, one in heritage millwork and carpentry and the other in heritage and traditional masonry. He holds two Red Seal certificates, in carpentry and cabinetmaking, and is Gold Seal Certified as a Superintendent, as well as being a certified National Construction Safety Officer. He founded the Professional School of Practical Stereotomy in Ottawa, Canada, where he gives courses in stereotomy. He has also delivered workshops in stereotomy across the U.S., Europe, and Canada.