
A Post & Beam Perspective

Post and beam is the basis of frame construction. Stonehenge is basic post and beam, its stability is due to the monolithic mass of the huge stones. From a wood perspective a simple post and beam frame can distort (called wrack) unless is held rigid. The methods of achieving rigidity and therefore structural integrity are by monolithic, diagonal, diaphragm and tensioning. It is interesting to examine the historic and regional differences influencing the methods in achieving structural integrity in wood frame buildings. In doing so we are able to trace the evolution of timber framing and ultimately the layout referencing method(s) used.

In the colder, forested northern regions for example, solid wood infill historically provided the protective, insulating barrier and the monolithic resistance to stop the frame from wracking. Traditional Scandinavian 'stav og laft' used a log post and beam framework with heavy plank infill. In early Canada the French used log infill between the posts called piece-sur-piece. The reference for layout would have been a centerline and the scribe as tool for the curved log surface. For more information regarding history and methods of log construction refer to the Master's Guide to Log Building.

Western and southern Europe in comparison to the north, was more populated with less wood resources. During the early Roman Empire the official method of building construction called 'opus craticium' combined the flexible strength of a hewn wood post and beam frame with a monolithic infill

of rock rubble. It proved to be very stable in this earthquake prone region, and was economical to build. Refer to Figure i-1. This frame and rubble construction would be known by many names; 'telar de medianera' in Spain, 'colombage' in France and 'himis' in Turkey. The method of joinery reference would have been from a centerline due to the irregular hewn timbers used.



Figure i-1
Roman Post and Beam
'Opus Craticium'

Looking eastward beyond the great deserts of Persia and Afghanistan to the temporal forest regions of India and Nepal, are more examples of timber post and beam with rubble infill wall construction similar to the West called 'dhajjidewari'. Refer to Figure i-2. Small internal and external diagonal bracing exists in coordination with the rubble to provide rigidity, but no evidence of a coherent braced timber framework, which was just now beginning to manifest in Europe.

In China, Korea and Japan there is prolific timber post and beam architecture, but no evidence of braced timber framework. During the 6th century, Buddhism spread religion and architecture

Figure i-2
Indian Post and Beam
'Dhajji-Dewari'



from China to Japan. Wooden post and beam construction was influenced by various religious sects (schools) and regional differences in style and technique such as Karaya (Chinese), Tenjikuyo (Indian), and Wayo (Japanese). Great, tiered post and beam temple pagodas were erected, all with one similarity, a complex system of bracketing called 'dougong' joining the posts to the roof system, rather than diagonal kneebraces employed by their European cousins. Refer to Figure i-3. Given the multiple heavy clay tile roofs, kneebracing would lever the corner joinery apart during an earthquake, the post bracketing is meant to move and act as shock-absorbers. In this case controlled flexibility is superior to rigidity. Typical residential construction was timber and log post and beam (no diagonal kneebracing) with bamboo wattle and clay daub wall infill, featuring an open floor plan based on a modular (tatami matt) spacing. Throughout the Orient all log and timber joinery was and still is referenced from a centerline, with the scribe and carpenter square used as layout tools.

Figure i-3
Korean Post and Beam



Medieval Europe between the 5th and 15th C was undergoing tremendous growth in cities and urbanization. It didn't take long before we see the inclusion of diagonal kneebraces within the basic post and beam framework. A prefabricated braced frame structure could be raised fast and efficiently. Monolithic rock rubble was replaced with infill walls comprised of wattle (stick weaving) and daub (clay and lime plaster). Two basic medieval timber braced framing styles emerged, as represented by the Germanic fachwerk construction, 'geschossbau' and 'stockwerksbau'. The geschossbau (translation: cross-bow) framing style was a series of cross-sectional (transverse) supports for the connecting beams and roof structure. In England this construction style was called 'half-timber' and the individual frames called 'bents', refer to project Hammer Bents for more information.

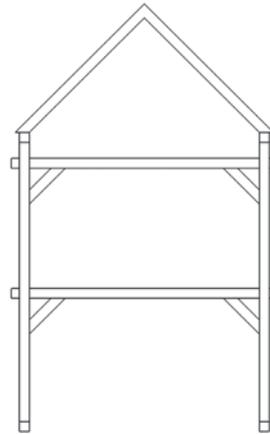
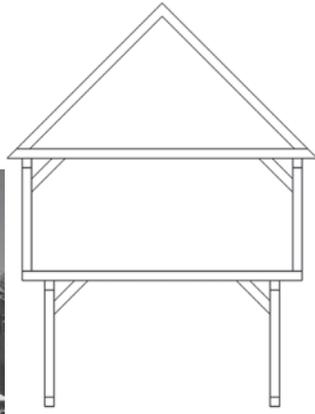


Figure i-4a
German Bents
'Geschossbau'

The problem with this style as a commercial building form was the restriction in the timber post lengths available, three floors being the maximum height. The stockwerksbau frame was a 'platform' system of stacking framework upon framework. This post and beam system allowed for more floors using shorter length posts, while cantilevering the platform frames gave additional space. Refer to Figure i-4. In either case, the method of joinery referencing would have been from a centerline (necessitated by irregular timbers and infill walls) using a carpenter square for layout.

Figure i-4b
German Post and Beam
'Stockwerksbau'



The colonization of the New World beginning in the 16th C brought a flood of European settlers to North America, and with them the skills of their ancestors. First log cabins then timber frame was the building scenario as forested clearings gave way to townships. Later, the Industrial revolution during the 18th C produced sawmills which produced boards, which caused a shift in preference from an infill to an exterior wall system. This resulted in a shift of reference, pertaining to historic timber frame joinery layout, from centerline to face referencing. The reason was to present a flat, uniform exterior timber surface on which to attach the new clapboard siding, for that modern look. Joinery accuracy was not the prime concern anymore as long as the exterior siding was straight.

By mid 19th C consumer demand and modern machinery resulted in the building method of stud frame, using smaller dimension lumber framing pieces nailed together with clapboard and cedar shingles as an exterior covering. New apprentices were taught to measure/layout directly from a machined surface using a carpenter square. Ornate posts, fretwork, and brackets embellished these 'Victorian' homes, it seemed traditional timber framing was a thing of the past.

Then late in the century an architectural rebellion began in England and spread to America. The Arts and Crafts Movement, as it was called, began as a reaction

against the machine-made goods of the Industrial revolution and the architecturally claustrophobic and grossly over embellished. It was a move towards a simpler, purer architecture both in form and function. Prominent architects of the day who embraced this philosophy included Frank Lloyd Wright, Gustav Stickley and the Greene brothers. All dramatically changed interiors from cubistic to open and free flowing. In particular, Charles and Henry Greene on California's west coast, combined the regional influences of Spanish 'mission' style and American 'shingle' with an Asian expression of exposed timbers, wide, low pitched roofs, and projecting porches. Refer to Figure 1-5. Timber post & beam was now a genre for the rich. For the developing mass market, efficient sawmills were mass-producing the smaller dimension lumber inexpensively. It became possible to buy an entire house precut and delivered, including windows, doors, and furnishings, through the Sears and Roebuck mail order catalogue.



Figure i-5
Arts and Crafts
Gamble House
Post and Beam

Two lumber frame building styles emerged during the 20th C, 'balloon' and 'platform' construction. First came balloon framing, which was comprised of lumber studs wire nailed from sill to sloping roof plate forming the gable elevation. Boards nailed diagonally gave rigidity to the frame. These cross-sectional wall frames were constructed on the floor and raised into position, much the same way that traditional timber 'bents' were laid out, assembled and raised (cite geschossbau). Like bents, these balloon frames were part of a transverse building method. And, like bents the balloon method was later discarded in favor of platform