

# Tools & Techniques

## Decoding Greene & Greene: The Step Mortise & Tenon

by James Ipekjian

Though nearly 100 years old, the furniture of Charles and Henry Greene continues to provide inspiration to contemporary woodworkers with an interest in the Arts & Crafts style. Greene & Greene pieces are characterized by Ebony pegs and splines, "cloud-lift" detailing, softened and rounded edges, and exquisite inlays of wood, metal, and stone.

Less appreciated are the construction elements of the furniture. With all that has been published on Greene & Greene, including beautifully photographed coffee table books, few have addressed the method of work, leaving most makers only able to make interpretations, based on photographs or behind a velvet rope view in museums.

As a furnituremaker in Pasadena, CA, I have been fortunate to be able to examine Greene & Greene furniture first hand. Initially, original pieces came into my shop for repair, and then the commission to reproduce the furniture for the Blacker House, Freeman Ford House, Robinson House, and others provided me access to examine further pieces in public and private collections, as well as museum archives.

With only rudimentary skills learned from their trade school education, it is apparent that the Greene brothers relied heavily upon those who actually built the furniture for construction direction, particularly Peter and John Hall and their cadre of workers. This is most apparent in the lack of detail in the Greenses' drawings, and it is even said that often Charles Greene would merely communicate design instructions verbally to the Halls, leaving execution to their own methods.

The origins of techniques are a little unclear. We know that the Halls followed in the Swedish cabinetmaking tradition, having learned their skills from their cabinetmaker father, and that they employed mostly highly trained workers from Sweden. Having never found a good source on historic Scandinavian woodworking, I can't confirm where various construction elements originated. I can only assume that the Halls' techniques followed traditional methods from the old country and possibly improvisation to accommodate Charles' ideas. What is clear is that they chose methods that were neither the easiest nor most efficient, however the finished pieces have lasted the test of time.

This is the first in an occasional series of articles in which I will share insights into various construction elements in Greene & Greene furniture.

### THE STEP MORTISE

Looking at Greene & Greene furniture, it is quite obvious that mortise and tenon was the most utilized method of joinery, both in the furniture as well as the post and beam components of their houses. What is less apparent is the technical element of the joint. One would assume that it is a traditional mortise and tenon, but it's not.

James Ipekjian has an intimate knowledge of Greene & Greene furniture and the craftsmanship of Peter and John Hall, having studied the original pieces first-hand for over 20 years. He has lead the renovation of several Greene & Greene residences and personally replicated the furnishings of the Blacker House and others.

Now, Jim will share his knowledge by developing a special *Beyond the Ropes* tour for the noted Greene & Greene home, the Gamble House. This "Details and Joinery" tour will be conducted from a woodworker's perspective to reveal exactly how the Gamble House was crafted: why the woods were chosen, how they were joined, and the thinking and collaboration that led to the actual craftsmanship. He will open drawers and desks to reveal details not normally shown to the public, as well as discuss the intricacies of the metal work and art glass created especially for the House.

*Details and Joinery: A Craftsman's Tour of The Gamble House* will debut on Tuesday, Mar. 6 and be offered on a quarterly basis. Limited to groups of eight, this 2 1/2 hour tour will cost \$75 per person, and reservations are required. Private group tours will also be available. For information and registration, visit the web site [www.gamblehouse.org](http://www.gamblehouse.org) or call: (626) 395-9783.

My initial experience in examining the inside of a mortise was in the restoration of a table and three chairs designed for the Bolton-Bush House. The table was originally a library table with a gate leg and a pair of drawers. It had later been modified by removing the drawers and raising the rails so that there was a continuous under top rail. When I removed the top (they used homemade steel desktop fasteners for the most part), I could see where the original rail came in, with a step notch that housed the whole rail. Seeing that, I started looking more closely at the chairs. I could see that the shoulder was not up against the leg; in fact, there was no shoulder visible, meaning the shoulder went inside the mortise. Should you get the opportunity to see an original piece, take a look for yourself.

The advantage of a stepped mortise and tenon is that it significantly increases the strength of the joint by providing a little more contact surface area for gluing. The legs in most Greene & Greene designs are often spindly, so there is not a lot of meat for a significantly sized tenon, and this step joint contributes a little bit more strength. In addition, racking is an important issue in chair building, and the first step helps hide any wood movement in the stresses when the chair is rocked back and forth.

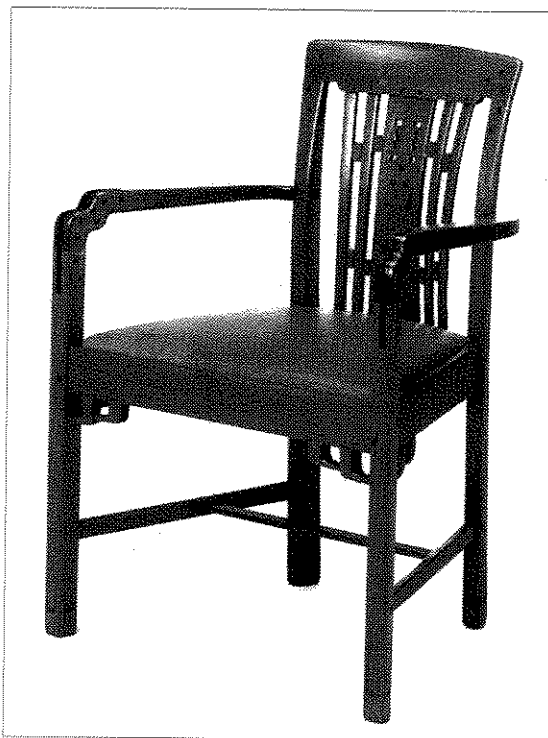
It is apparent from x-rays that the mortises were made by drilling holes, possibly by a drill press but more likely by boring holes with bit and brace. Though meticulous about details on the outside, they were not concerned about what the inside of the mortise looked like, often the bottom was rough and far deeper than the tenon. However, they made sure that when they chiseled the sides of the mortises, the tenons fit nicely. . . and technically that's all that really matters.

One has to imagine that the process of housing the railing or the post was not that much different than the way that I do it today: cut the mortise, size the tenon, and assemble it. Then, I outline the shape of the shoulder being mortised in onto the part that has the mortise, and with chisels, I very carefully create a secondary socket to house the entire part. Only I use a pin router or a mortising machine to cut the mortise, and a shaper or table saw with dado set to cut the tenon.

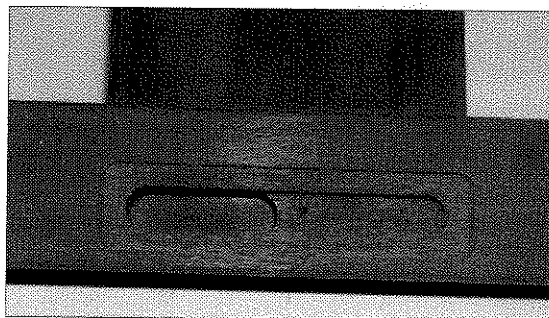
As seen in the chair leg example in Figure 1, the mortise has a first step about  $\frac{1}{8}$ " deep. Because of the angle of the seat rail, the second step is about  $\frac{1}{4}$ ", and the third is about an inch. I have experimented cutting everything to finish all at once, but it was always problematic with tear-out. Moreover, the amount of time it would take to produce a jig that was accurate and robust enough for repeat uses never seemed justified. So, I cut them one step at a time. The 3-step tenon on the seat rail (Figure 2) is cut on the taper for up to a  $1\frac{3}{4}$ " tenon, otherwise I used the tablesaw with dado set for larger sizes.

Although this example features a Blacker House chair, this joint was not limited to chairmaking. It was used in case goods and architectural applications, where ever there was concern about movement where the opening of a gap would be unsightly.

I will explore this and other aspects of Greene & Greene from a woodworkers' perspective in a series of *Behind of Ropes* tours of the Gamble House in Pasadena, CA (see side bar).



*An Original Blacker House Armed Chair  
Mahogany, Ebony  
(33  $\frac{3}{8}$ " h, 24  $\frac{1}{4}$ " w, 21  $\frac{5}{8}$ " h)  
In the collection of the  
Los Angeles Museum of Art*



**Figure 1.** A 3-step mortise cut by James Ipekjian in making reproductions of a Greene & Greene chair.

**Figure 2.** A 3-step tenon of a seat rail for a Greene & Greene reproduction chair.

