TIMBER FRAMING

JOURNAL OF THE TIMBER FRAMERS GUILD

Number 47, March 1998

Stirling Castle's Great Hall Roof

Historic Scotland

A Tale of Two Saunas

Yuko Seki

Timber Frames of Chartres

Paul Oatman

TIMBER FRAMING
JOURNAL OF THE TIMBER FRAMERS GUILD
Number 47 March 1998

CONTENTS

Published Quarterly

PO Box 1075, Bellingham, WA 98227
360-733-4001
tfguild@telcomplus.com
www.tfguild.org

Editorial Correspondence
PO Box 275, Newbury, VT 05051
802-866-5684 rower@connriver.net

Editor: Kenneth Rower

Contributing Editors
History: Jack Sobon
Timber Frame Design: Ed Levin

Correspondents
England: Paul Price
Japan: Michael Anderson

Subscription $20.00 Annually
Or by Membership in the Guild

ISSN 1061-9860

1 9 8 5

EXHIBITIONS

Mechanical Marvels

Mechanical Marvels: Invention in the Age of Leonardo, by Paolo Galluzzi, Istituto e Museo Storia della Scienza, Florence, 1997, ISBN 88-09-20959-1. Printed and distributed by Giunti, Florence. Paper, 8.25x11.75 in., 250 pp., profusely illustrated in color. About $30. A CD-ROM including animated models of most of the machines is also available from Giunti.

JUDGING from such examples as the Rube Goldberg construction of the water-powered Garland Mill and the 600-year-old design schematics for last year's trébuchet project, it is clear the membership of the Timber Framers Guild has arrived at the cutting edge of 15th-century technology. While it has been rumored that such innovations as electricity and the internal combustion engine provide for great strides in the field of construction, some would maintain that a couple of felled trees, a capable blacksmith and a big enough rock are all that might be needed to accomplish any task at hand.

In my own work, I often feel that I am standing with one foot firmly planted in the 15th century and the other in the 21st. (I take a short break from my word processor to feed the wood fire and make a trip to the outhouse.) So it was with no little excitement that I headed down to the Liberty Street Gallery in Lower Manhattan to see "Mechanical Marvels: Invention in the Age of Leonardo," a traveling exhibit organized by the Museum of the History of Science in Florence and thoroughly documented in the beautifully printed color catalog described above, informative and worth owning.

The visitor to the show began with Filippo Brunelleschi (1377-1446) and his 1436 design for the dome of the Florence Cathedral. With its span of 33m and height of 22m the largest dome ever to be built without the use of wooden centering, the problem how to construct it had stymied local officials for years. At one point the town fathers had actually considered filling the huge transept of the cathedral with dirt to act as centering for the dome. The inclusion of a fair number of gold coins in with the dirt would insure that the dirt be carried out one bucket at a time by the townspeople after construction was complete. Eventually Brunelleschi's scheme, a massive double dome of wood and masonry that would be self-supporting during construction, won out in an open competition.

An impressive 1:20 cutaway model of the dome marked the start of the New York exhibition. Inside the gallery, a dynamic model 2m wide showed the method of maintaining the curvature of the dome. (The radius of the dome is equal to four-fifths of the diagonal of the dome's octagonal base.) This model and accompanying proportional studies in three dimensions left me slack-jawed and humble. Now, *this* was architecture.

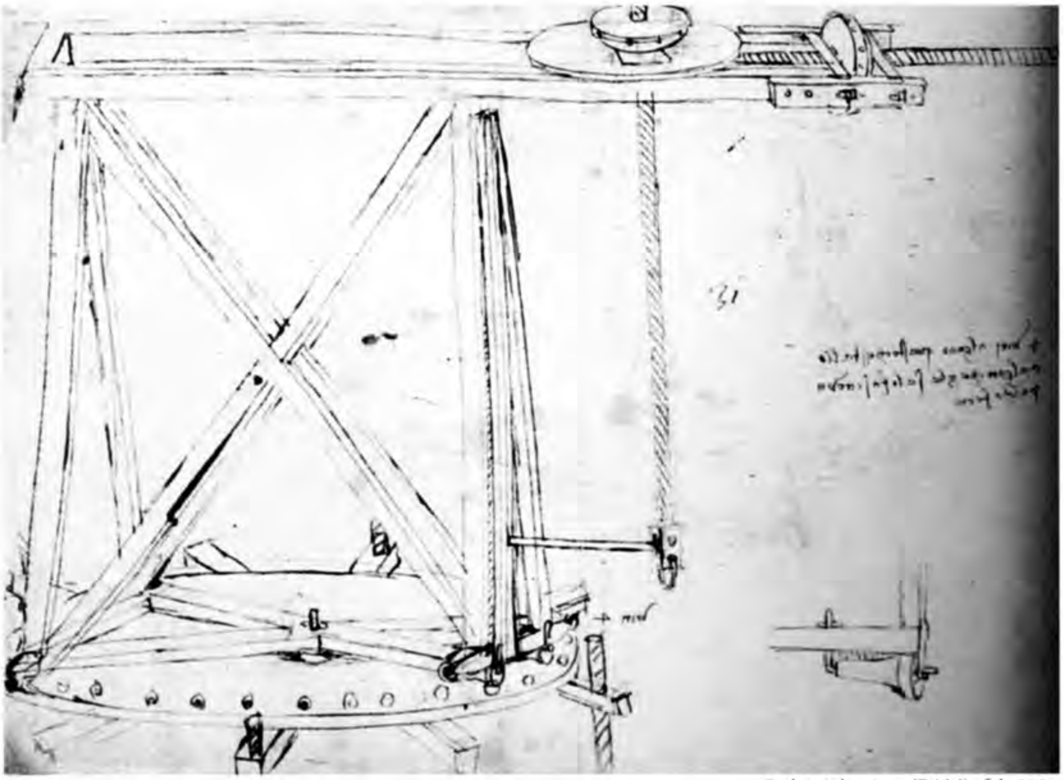
The fun, however, was just beginning. This exhibition featured not only the design of buildings and public works but also the machines that would likely have been used to build them. Full-scale copies of iron turnbuckles and pulleys along with large-scale models (up to 3m square) gave a sense of technology ca. 1430. Among these large models was a three-speed hoisting mechanism, a revolving crane (20m. high at full scale) and a light hoist designed by Brunelleschi that incorporated gears with revolving teeth (his invention), meant to reduce friction when in operation. Each of these large models was accompanied by a tabletop-sized machined metal model which could be operated by gallery visitors. The larger models were strictly hands-off, but a few surreptitious pokes out of view of the equally large gallery guards revealed that the former were in working condition as well. These large models were breathtakingly crafted with traditional joinery in a mix of hardwoods. The design of each machine was taken from the notebooks of Brunelleschi, da Vinci, Ghiberti or their contemporaries. These drawings in many cases were as riveting as the models. A da Vinci hoist is shown at right in drawing and model.

The second part of the show was devoted to Sienese engineers of 1450-1500. Items here most familiar to Guild members would be the (original) drawings and models of war machines, including several versions of a trébuchet (see TF 44 for more on trébuchet design), but the large civil-engineering wonders extended to a mud dredge, a recirculating water mill and a rack-and-pinion lift to raise massive columns to a standing position. Each model left me wide-eyed in a combination of envy (that a bunch of Italian artisans actually got paid to make these beautiful models) and covetousness (I *wanted* them).

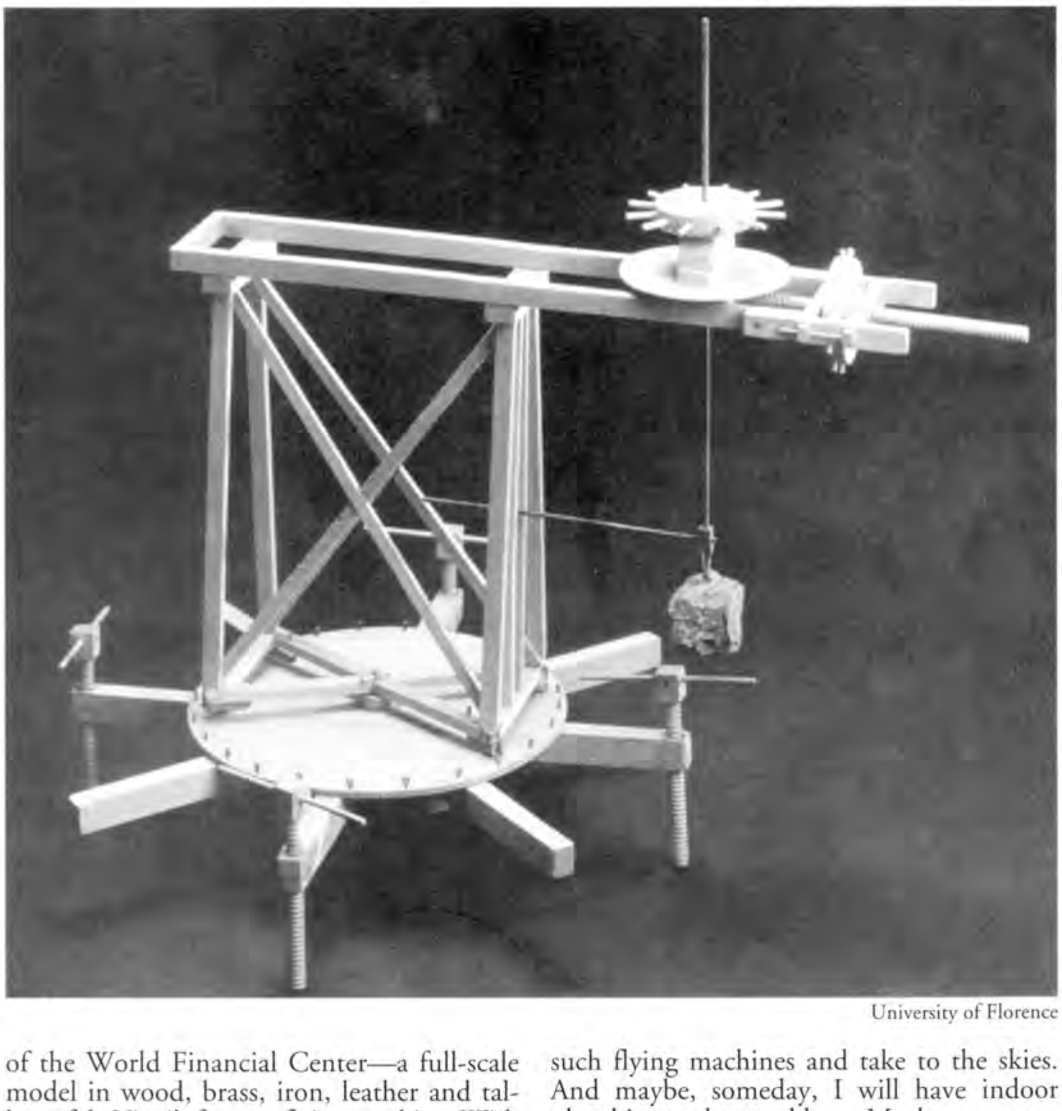
The last part of the show celebrated the life and work of Leonardo da Vinci (1453-1519). Facsimiles of his anatomical and mechanical sketches revealed a man deeply curious about the working of things. Da Vinci is credited as the first to analyze machine-design as a series of distinct basic elements or "organs." He employed similar principles in his study of the human body, paving the way for the modern study of anatomy. Models of simple gearing devices showed how speed, direction and force of motion can be mechanically manipulated. I was especially drawn to these elegant models, which could be easily understood and appreciated by a small child. The child in me wanted to return home immediately to devote long snowy days to the construction of mysterious gear and pulley devices.

The most dramatic piece of the show was on view a block north in the Winter Garden

TIMBER FRAMING, Journal of the Timber Framers Guild of North America, reports on the work of the Guild and its members, and appears quarterly, in March, June, September and December. TIMBER FRAMING is written by its readers and welcomes interesting articles by experienced and novice writers alike. Contributions are paid for upon publication at the rate of $125 per published page.



Codex Atlanticus (BAM), fol. 808v



University of Florence

of the World Financial Center—a full-scale model in wood, brass, iron, leather and tallow of da Vinci's famous flying machine. With a wingspan of over 10m, the machine combined the robust solidity of the other mechanical models with the heart-catching delicacy of a bird in flight. It inspired my 15th-century half to believe, almost, that someday humans will be able to climb into such flying machines and take to the skies. And maybe, someday, I will have indoor plumbing and central heat. Maybe.

—ANDREA WARCHAIZER

Andrea Warchaizer designs timber frames as Springpoint Design in Alstead, N.H. The exhibition has moved on to Germany, Australia and Japan. Information can be found at www.imss.fi.it/news/mostra/index.

TOPICS
Handwork

AND yet, there in my old-fashioned shop, the new machinery had almost forced its way in—the thin end of the wedge of scientific engineering. And from the first day the machines began running, the use of axes and adzes disappeared from the well-known places, the saws and saw-pit became obsolete. We forgot what chips were like. There, in that one little spot, the ancient provincial life of England was put into a back seat. It made a difference to me personally, little as I dreamt of such a thing. "The men," though still my friends, as I fancied, became machine "hands." Unintentionally, I had made them servants waiting upon gas combustion. No longer was the power of horses the only force they had to consider. Rather, they were under the power of molecular forces. But to this day the few survivors of them do not know it.

GEORGE STURTT wrote this passage in *The Wheelwright's Shop,* evoking England in the late 1880s, when he took over his father's workshop. The Industrial Revolution was changing forever the way in which products were made, and in so doing, Sturtt felt, it was also changing the products themselves.

For the past five years or so, I have been troubled by a feeling that what Sturtt observed some one hundred years ago has been happening in the craft of timber framing. As defined in The Random House Dictionary, a craft is "an art, trade, or occupation requiring special skill, esp. manual skill." I question if this definition applies to the current state of our trade.

Timber framing nearly disappeared as a result of this very same "revolution," and it was rescued by individuals nearly a century later who rediscovered the beauty and strength of timber-framed buildings and found pleasure in working with their hands in a time-honored tradition. Out of that, the Timber Framers Guild of North America was founded and continues to this day. But since that rediscovery the work has been taken from the hands of the worker and placed in the clamps of mortising machines and tenon cutters. The end result is apparently the same, but I suggest that the worker suffers as a result, and therefore the craft suffers as well.

I have worked in true machine shops and watched as the operators stood sullenly at their places, eyeing the clock, anticipating the next break or the end of the day. The work got done, the product went out, but something was wrong.

I fear that our craft has been harmed by the demand for it that we have created. If one takes a look at the other crafts or trades that are lovingly preserved today, what does one see? How are the products made? The answer is, by hand. Basket weavers, coopers, weavers, blacksmiths, masons, the list could easily go on, but one thing is held in common through

Continued on page 20

A New Roof at Scotland's Stirling Castle

Historic Scotland

The top of the Great Hall was totally enclosed by a temporary structure in its own right, according to Bill Keir, "a masterwork of engineering and construction," since the castle sits high above the town on an exposed rock. Five overhead rails carried rolling chain hoists (one in use above) to allow setting of the timber, which had to be threaded through the two sets of scaffolding that ran the length of the Hall. The raising crew included Canadian rock climbers and Scottish steel erectors.

THE Great Hall of Scotland's Stirling Castle lost its original 16th-century hammer-beam roof in the late 18th century. Last year, Carpenter Oak & Woodland of Chippenham (Wiltshire), on behalf of the Scottish preservation group Historic Scotland, fabricated and raised a forest of new, mostly Scottish oak to reconstruct the roof frame. The roof has now been sheathed and recently we completed installation of the stainless steel rods that tie together the walls at the base of the roof structure.

Stirling Castle is arguably the most historically significant castle in Scotland. Here in 1314 the English governor Alexander Mowbray refused refuge to Edward II as he fled the nearby Battle of Bannockburn, Robert the Bruce's splendid victory in the war for Scottish Independence. The castle commands an amazing site, standing very exposed high up on a steep-sided volcanic plug overlooking the River Forth, some 37 miles from Edinburgh. The Great Hall was completed around 1502 for James IV, with granite walls and a huge, oak roof, making an undoubtedly magnificent interior space 126 ft. long and 36 ft. wide. But in the 1700s the castle was turned into a military barracks and the roof removed, leaving as the only record of it a pair of contemporary (1719) Board of Ordinance drawings.

According to Historic Scotland, the hall itself was then divided into two stories and an attic, and the only remaining evidence of the fine hammer beam roof were two full corbels that would have supported a principal truss and the "cloured" (battered) remains of the others. Apart from those in the gable ends, the medieval windows were replaced by Georgian sash and casements. Parapets were removed and the high roof was extended to the wall faces. Dormer windows as well as chimneys to serve the fireplaces below now interrupted the sweep of the roof.

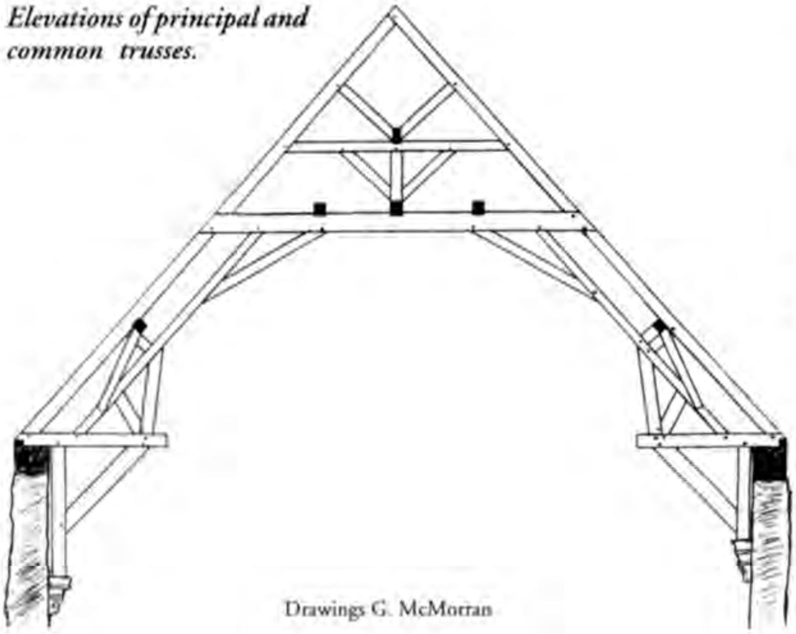
When the Army departed the castle in 1964, restoration work began with the deliberate removal of the internal floors and the cross-walls. Painstaking investigation followed of the slim remains of the medieval windows and the original fireplaces along the side walls and at the center of the royal dais. Profiles of altered areas and moldings were taken, and stone by stone the missing parts were drawn up for reproduction.

As for the timber roof, it was known from documents that the framing arrangement was similar to that of a surviving roof, the one at Edinburgh Castle, also constructed around 1500. Although that roof spans 33 ft. rather than Stirling's 36 ft., and at a lower pitch, study of timber sizes and joinery provided guidance in the frame design at Stirling.

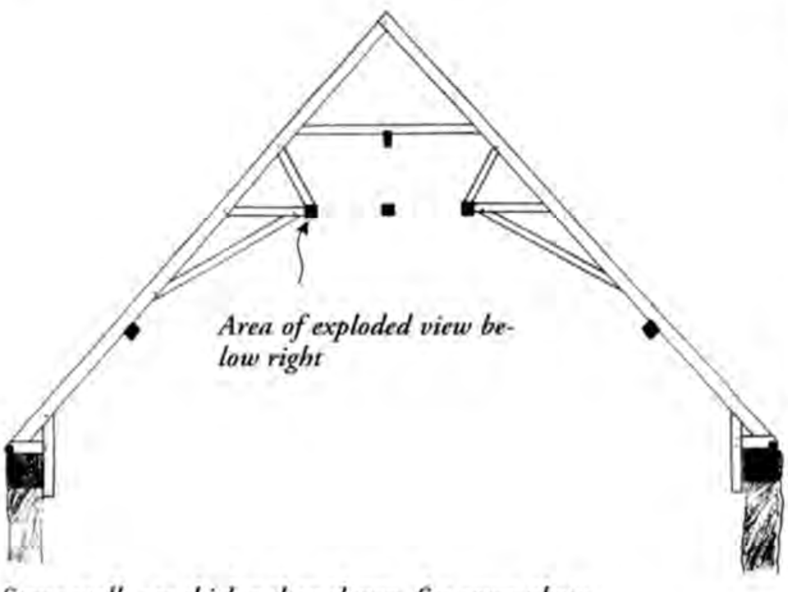
Stirling's is definitely an unusual roof design in its hammer beam trusses and, as well, its array of six purlin runs (of four types) that interlock with the trusses. There are 14 principal trusses, with three common trusses in each of the 13 bays and a pair of commons at each end, making for 57 trusses in all. The scantlings throughout are not huge—6x8 rafters, for example. In the principal trusses, a top central purlin sits on a crown post on the upper collars, and the side purlins are clasped between doubled rafters.

To start with, we had drawings of the general arrangement of the truss elevations, the plan and the joint details. We did not change the position of timbers, but we did suggest some changes to the joint detailing, such as notching purlins to allow for timber variations and adding some lengthwise bracing. From the details

Elevations of principal and common trusses.



Drawings G. McMorran



Stone walls are thicker than shown. See cover photo.

we made up representative joints for testing by engineers at Strathclyde University. The joints tested well, even including pegged mortise-and-tenons in tension.

A survey of the existing wall-heads revealed that the west wall bowed outward quite alarmingly, over a foot in places, so that in plan the wall formed a long S-curve. (It is suggested that the lime mortar in this thick and many-windowed wall had not cured completely back in 1502 when loaded by the original roof, and the wall yielded early on.) To stabilize the wall-heads for the new work, a reinforced, 16-in.-square concrete beam was formed up and placed on top of the west wall following the distorted shape, and another on top of the relatively straight east wall. Next, locating the positions along the walls of corbels that would support hammer posts, we found that opposite feet of principal trusses would need to vary by up to 6 in. to match them, thus throwing the trusses out of square to the ridge line. Finally, the timber quality varied drastically, not surprising considering we were dealing with 100 tons of Scottish oak cut over a two-year period.

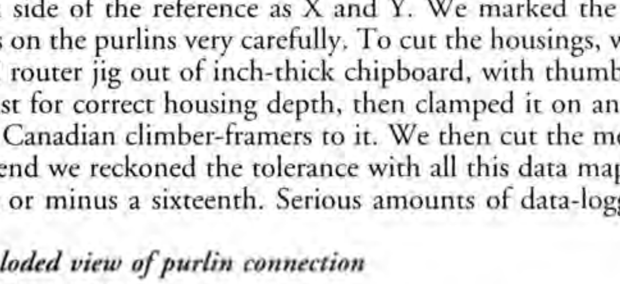
Our goal was to arrive at a level, straight ridge with flat roof planes, atop out-of-parallel trusses on unequal centers, each with slightly different pitch and span, all resting on one straight and one S-shaped wall, using variously wet, dry, waney, twisted, bowed, crooked or out-of-square timber. It didn't take us long to decide to scribe the whole frame over full-size chalk layouts. The major datum lines were marked permanently on the workshop floor.

Organizing and grading the timbers as they arrived from Scotland was essential. We gave a code letter to each truss element and sorted them into packs, paying attention to the grade of all timbers. The first loads we received had a high incidence of heart-rot, some of which was not discovered until we started to cut a tenon—really a bit late! After a while we became quite ruthless in grading. However, we still had a good deal of timber variation to deal with, so we centered all joints and marked plenty of lines on timbers to keep our references clear, all these lines to be kept level during scribing. This job really pushed our scribing skills to the maximum, and we got many skewed-looking yet well-fitted shoulders.

Given the size of the trusses, we split the work into manageable sections. The principal trusses divided easily into three parts, the upper principal truss and the two doubled-rafter side assemblies. The east ends of trusses would remain constant throughout the job and the west ends would fan out and in with the west wall's curves. Having cut the doubled rafter asssemblies, we framed the upper main trusses, trying to remember that what looked like a 20-ft. tie beam was actually just a collar. The common trusses also split to give two sides plus a collar that could be separately framed into each side. We made up the 38-ft. rafters of two shorter 6x8 timbers joined by wedged, tabled and butted scarfs (also called *traits de jupiter* in France and bolts-o'-lightning in America), with skewed pegs through the tables. Eighty-six scarfs in all!

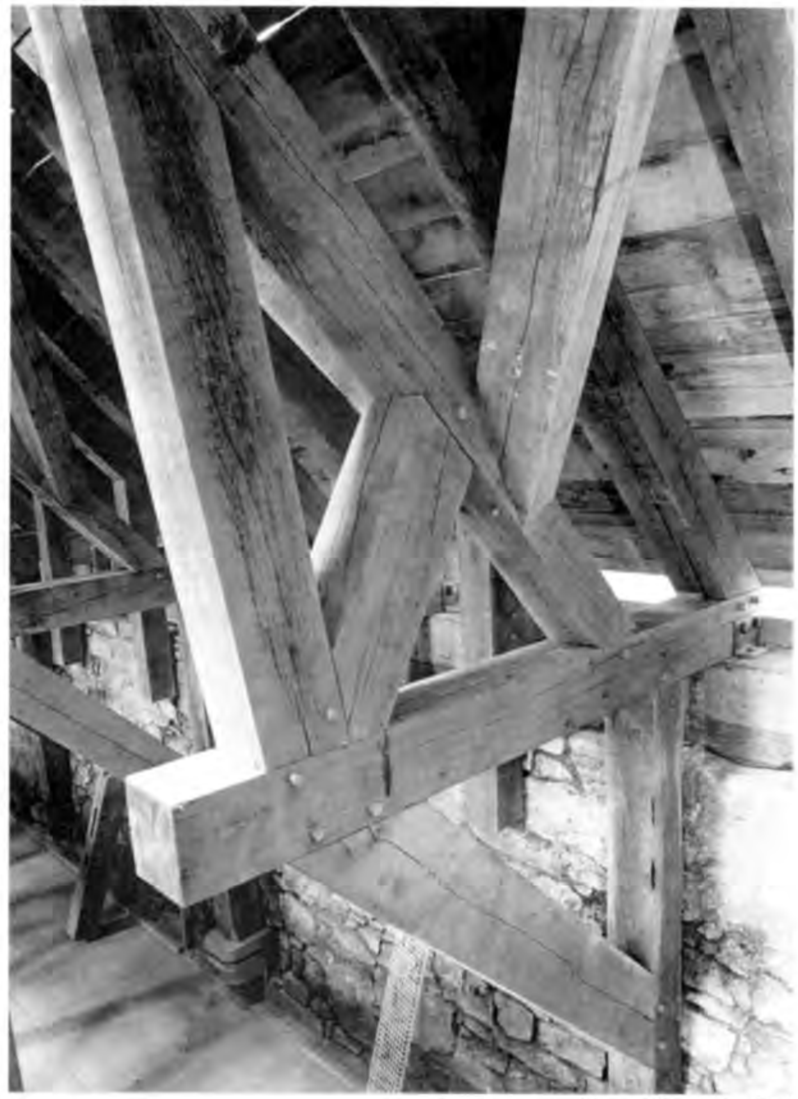
As shown in the figure, on each side a short tie supported by a brace reaches out to a purlin and a strut goes back up to the rafter. Obviously, scribing this purlin would have made things very difficult (imagine trying to set up the timbers), so here we abandoned scribing and switched to mapping. In the floor layout we drew the purlin as a 6⅞-in. square and cut shoulders on our strut and short tie to this imagined square purlin. To cut purlin housings for these shoulders we had to locate their position and size, then figure out how to make the cuts. Placing housings meant keeping reams of data, measuring the amount of timber variation in the strut and tie relative to our reference lines and recording the dimensions on each side of the reference as X and Y. We marked the reference lines on the purlins very carefully. To cut the housings, we made a wild router jig out of inch-thick chipboard, with thumbscrews to adjust for correct housing depth, then clamped it on and left our two Canadian climber-framers to it. We then cut the mortises. In the end we reckoned the tolerance with all this data mapping was plus or minus a sixteenth. Serious amounts of data-logging were

Exploded view of purlin connection at common truss



similarly required to size the notches in the other purlins for rafters or collars. Every timber intersecting a purlin had its X and Y dimensions recorded and kept in a log book to give the purlin layout.

We finished in May after five months of framing, and we were ready to go to Scotland where the Great Hall awaited its new roof under a galeproof and even bigger steel scaffold roof. Five very carefully sorted truckloads of timber made their way to Historic



Photos Historic Scotland

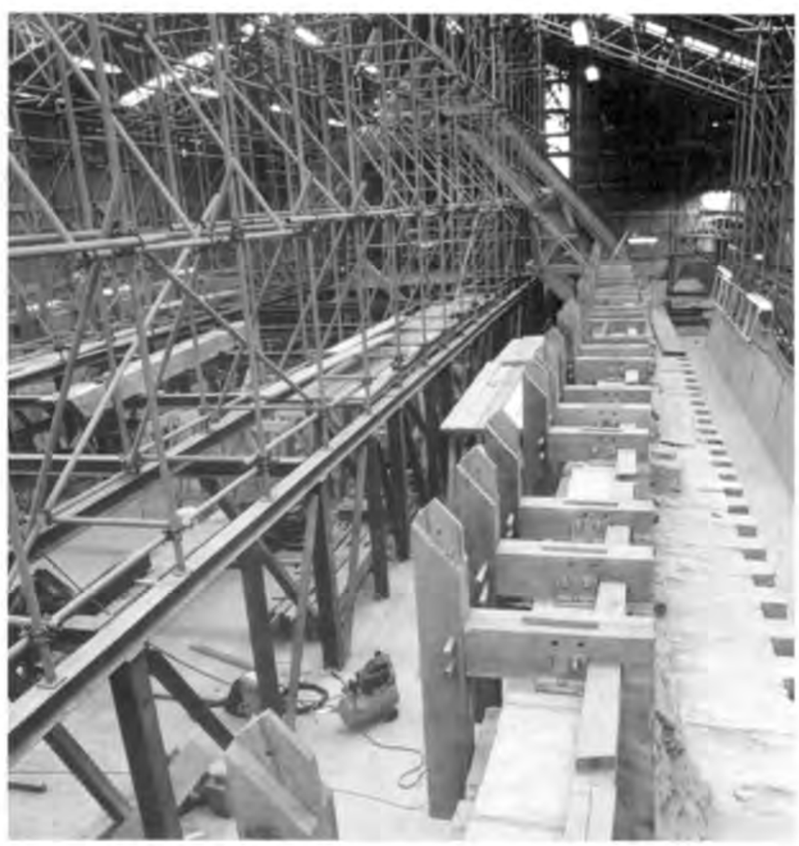
At top, model of Stirling's Great Hall as it will appear when restored to its 16th-century form, including parapets and uninterrupted roof. Above, the east wall and the 18th-century dormers before restoration. Sash, casements have been removed to make way for medieval glazing.

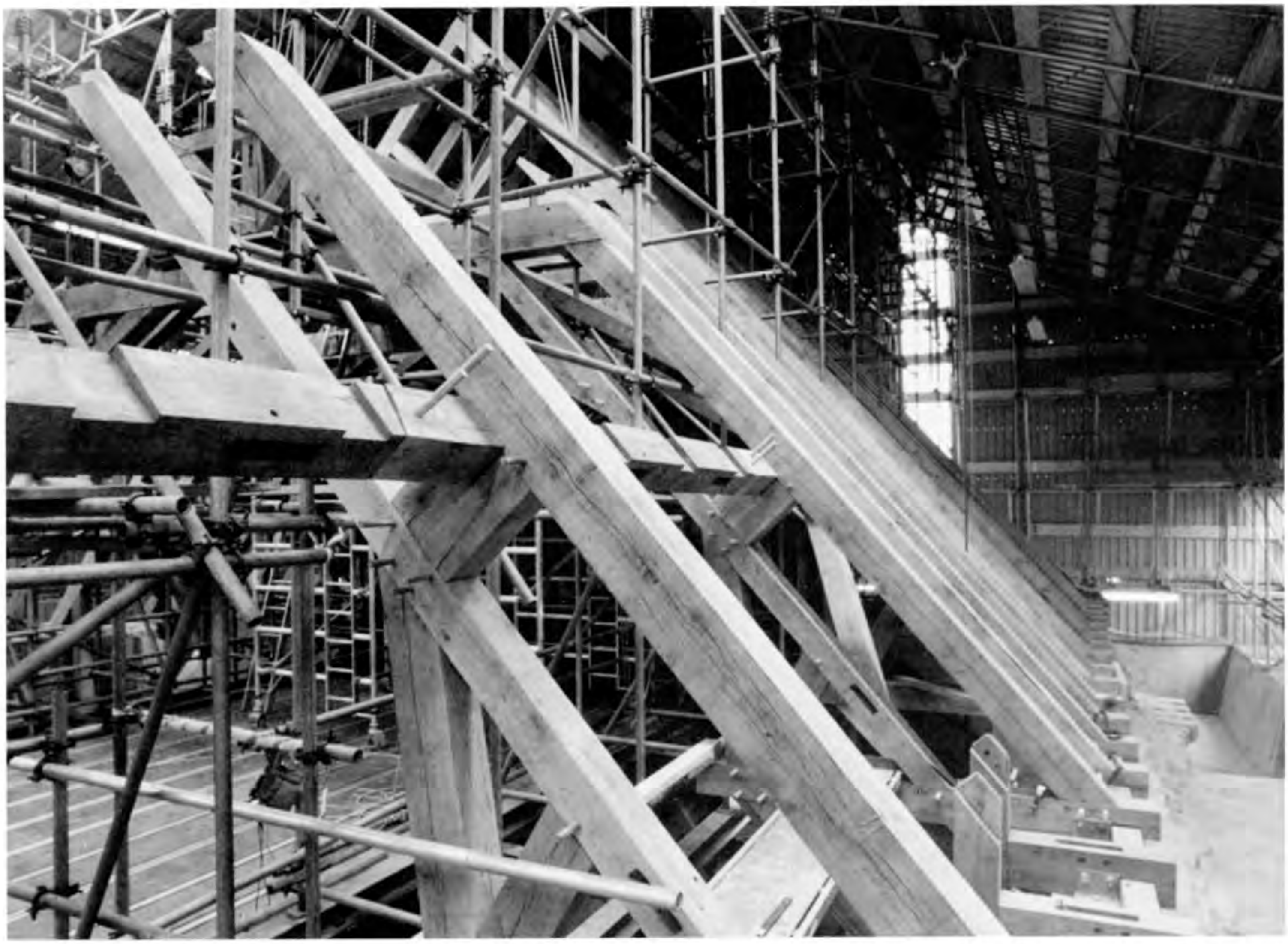
Canted hammer post and hammer beam connection at wall. Raking strut rising toward upper right is part of lengthwise bracing system. Below, wall brackets awaiting setting of rafters, proceeding from far end. Brackets are firmly bolted to the wall-head cast concrete beam.

Scotland's stores in Stirling town, where all the timbers were sandblasted clean. Unfortunately, the timbers got completely mixed up during the cleaning, and it took a good deal of time to re-sort everything.

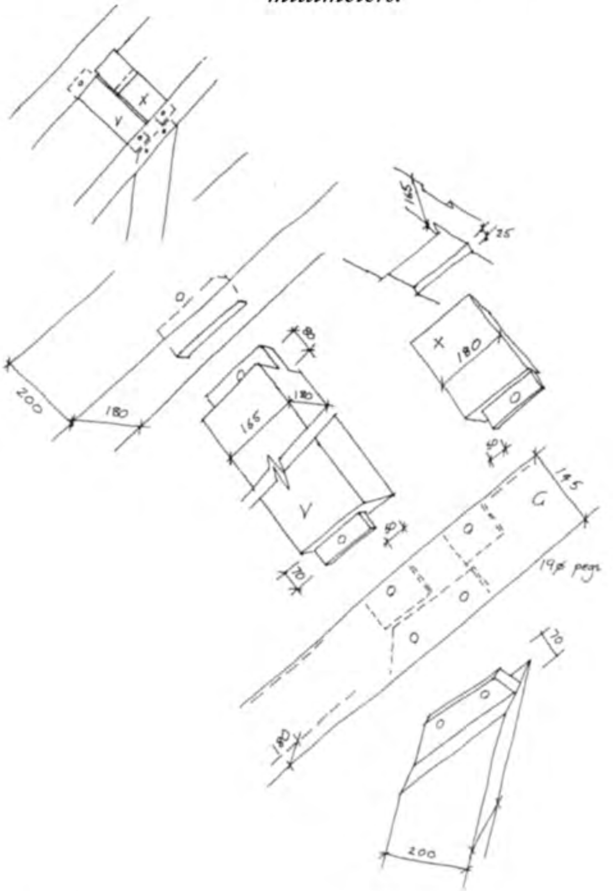
The sorting was critical because the safe working load of the main hoist to the raising area was only 750kg, or about 1650 pounds. The timber had to be taken from the stores to the castle in Historic Scotland's 6-ft.-wide, 3-ton truck, specially made to move through the narrow confines of the castle. To make one payload of three long tons (3,000kg), the timber had to be sorted in raisable order into four liftable 750kg packs. Getting the timber up to the roof was quite an operation, too. Winch up off the truck, then up 39 ft. onto a platform scaffold, through a doorway into the Hall, hoist 8 ft. to the working deck, trolley the pack to one side or the other. We got this down to a pretty slick operation, getting each pack from truck to top safely and within 15 minutes.

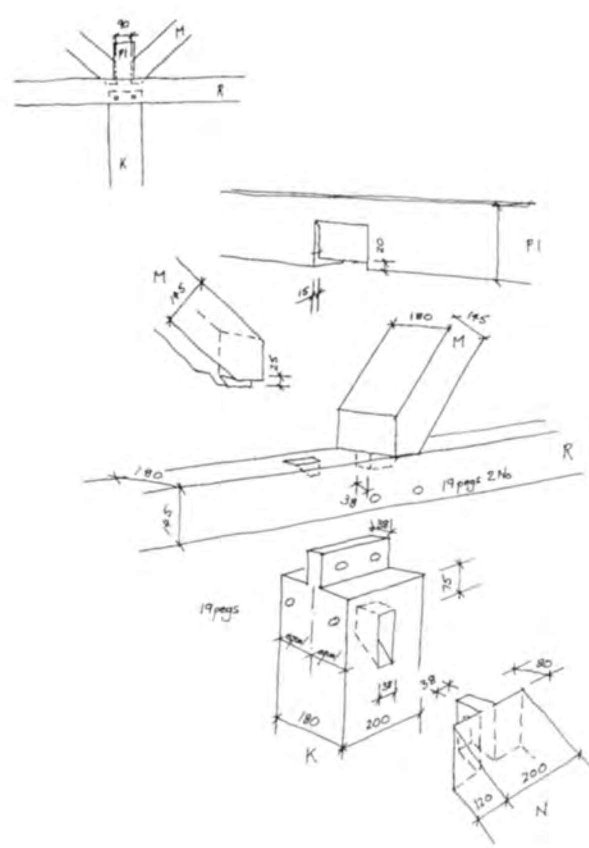
RAISING the frame went very smoothly indeed, in great part thanks to a really well designed scaffolding that included five hoisting beams running the length of the building. We had chain hoists on trolleys on each of these beams, and once these were in place it made for a terrific raising arrangement. The high-advantage hoists had very long chains, so it sometimes took 10 minutes of chain-hauling to get a piece into position, but it was simple, effective and safe. As raisings often do, this one developed a rhythm with essentially two crews, one at a lower level putting in hammer



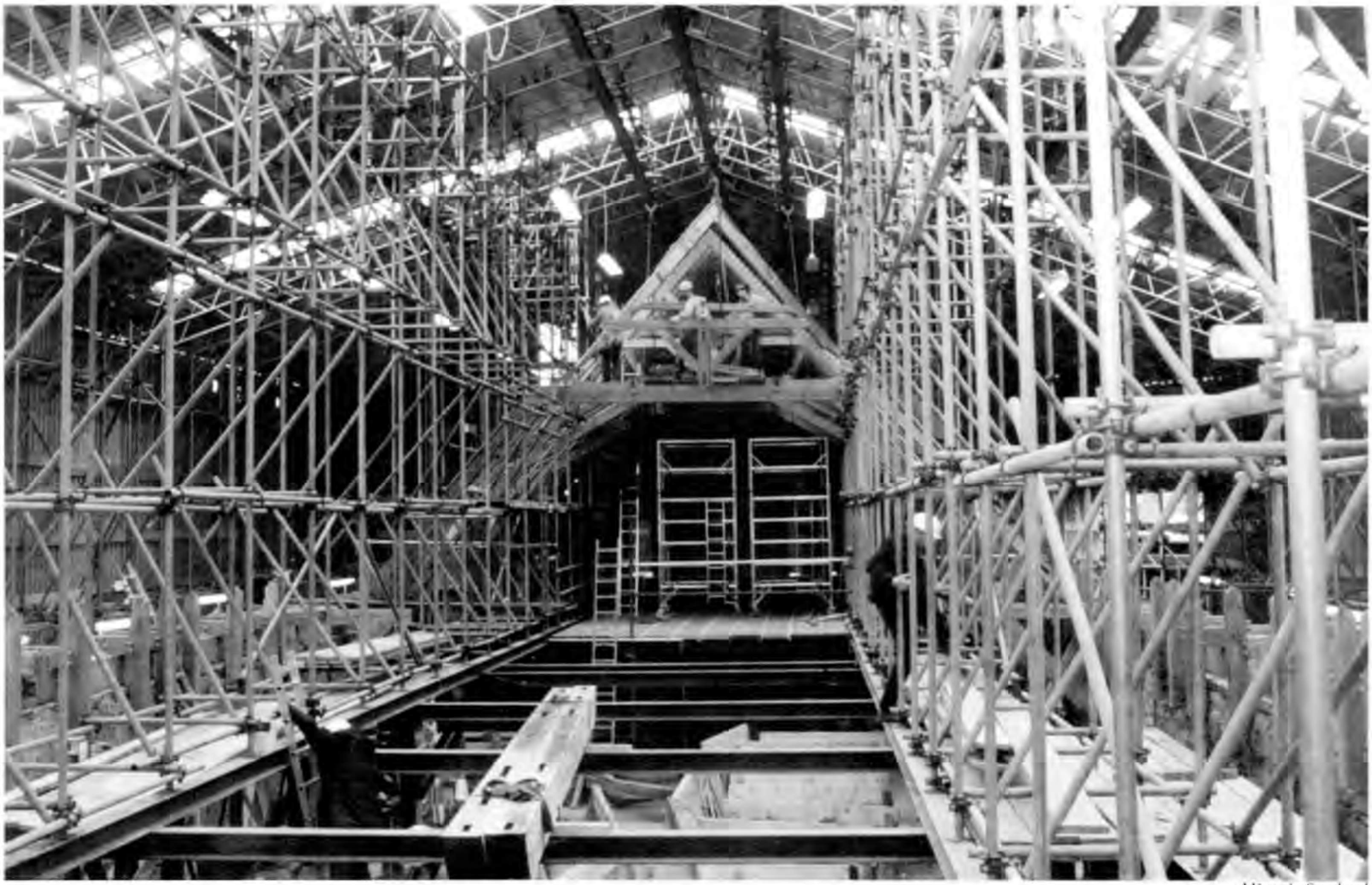


Lower halves of doubled principal rafters in place, commons and upper sections coming along from far end. Although much data and some drawings were computer generated, working drawings followed a hand format. At left below, connection between doubled rafters (also visible in photo above). At right below, purlin-over-collar connection atop a crown post. Dimensions in millimeters.





Carpenter Oak



Historic Scotland

Above, installing upper truss elements. Floor of Great Hall is far below, out of sight beneath temporary floor (supporting timber horses) at bottom center of photo. At right below, north elevation showing position of the trusswork at lower end of restored hall.

beams and moving along just ahead of another team filling in and assembling upper trusses. Ten weeks on site and the frame was finished with a bare minimum of cock-ups, all easily corrected, and on schedule. Pretty good going for 1,328 pieces! We laid down the quarter-acre of inch-thick oak "sarking" (sheathing), using pneumatic guns to nail it, but this has now been taken up to be relaid in a different pattern. Recently fitted after two false starts are the six, super-high-spec, 17mm-dia. Nitronic 50 stainless steel tie rods that span the hall at the level of the 16-in.-square concrete wall-head beams. Each rod, tensioned to 26kN (5,850 lbs.), passes through a suspended sleeve at midspan and is fitted at each end with turnbuckles and strain gauges linked to a data recorder. The array of rods is expected to report on the loaded behavior of the roof, as well as to add a safety factor to its stability under the 88-ton weight of the 107 squares of slate roofing to come and its exposure to the winds of a Scottish hilltop site.

Stirling Castle's Great Hall has its roof again, and the Hall is going to be ready for the Millennium Party. We used modern tools and traditional methods to make it, and I think this is a good approach. It's economic to build, but the result is right. Just as the carpenters did in 1502, we put the lines in the right place and cut away the waste as quickly as possible. It was a great experience to cut and raise, and it will be a brilliant space to party in.

—Steve Lawrence, Paul Price and Ken Rower

Steve Lawrence took a lead role for Carpenter Oak & Woodland on the Stirling job. Paul Price assisted substantially in the preparation of this article, which appears in different form in No. 6 of his occasional journal The Mortice and Tenon, *published in Dorset. Additional information was provided to Ken Rower by Peter Buchanan and John Turner of Historic Scotland and Bill Keir of Carpenter Oak.*

Historic Scotland

A Tale of Two Saunas

TO learn the design of wooden furniture and the practical techniques of cabinetmaking from the ground up was my goal when I picked up my life and moved to Finland, Land of Trees, in the summer of 1994. I'll weave a tale for you about a way of relating to trees and forest, a daily existence informed by an ecological mindset, inconceivable from the vantage point of my urban lifestyle in Japan, and introduce two wooden sauna workshops, one in Finland, the other in Japan.

Rich in forest resources, Finland sits at about the same latitude as Alaska. With Japan, it holds a place near the top of the list of countries whose forests cover the greatest percentage of their national territory. Although the numbers are unclear with respect to internationally recognized standards of measurement, depending on which source you consult Finland stands somewhere between 65 and 80 percent forested. As you go north into the part of the country known as Lapland, the landscape changes to gently rolling hills covered with low shrubs and only sparsely populated with slender trunks of white birch. Perhaps the overall rate is close to 70%. Stretching from the eastern border with Russia is a broad network of 180,000 lakes, remnants of the glacial age, that provide numerous breaks of light and visibility in otherwise continuous forest. On this flat topography, the mixture of some broad-leaved trees with the erect forms of dominant conifers makes for an even forest-scape. Despite the relatively slow rate of tree growth in this frigid climate, in recent years annual growth has exceeded the rate of cutting, and, seeking to increase employment and the demand for timber, Finland is beginning actively to export timber to Japan in addition to its usual market in the European community. Since the 1980s, automation of timber cutting has proceeded apace, resulting in widespread unemployment in this critical industry.

By comparison, although 67 percent of Japan is forested, the majority of timber is in steep, mountainous regions, and because of the warm, moist climate, weeds and undergrowth are thick, almost jungle-like, making large-scale automation no easy task. In this predominantly wood-oriented building culture, there is a historical pattern of repeated cutting and replanting of forests, guided by trial and error. About 30 percent of Japan's land is devoted to manmade plantations of coniferous woods such as *hinoki* (Japanese cypress) and *sugi (Cryptomeria japonica)*, commonly used as building materials. These plantations practice *eda'uchi* (cutting off the lower branches to reduce the number of branch joints and make trunks of uniform thickness) and *kanbatsu* (thinning every 10 to 20 years). The large numbers of especially fast growing *sugi* planted after World War II will be ready for harvesting for residential construction use in the near future. But in the past 50 years, Japan's wood construction industry has seen some significant changes. Looking just at the numbers, it would seem that market demand could be satisfied entirely by domestic timber, and yet because of prohibitive production costs, the reality is that Japan now imports close to 80 percent of its needs. Further, a direct relationship between the planting of artificial single-variety forests and various negative ecological effects and natural disasters has been observed, and this is leading to greater concern over protection of the environment.

WOODEN architecture has a long history in both Finland and Japan, and their respective techniques of log building and timber framing have been handed down to us today. However, in the course of the several decades since the end of World War II, these traditional methods have been swept up in the overwhelming trends toward rationalization and automation in the building industry, changing form in the process. Most of the work is done at a factory, with standardized parts assembled according to an instruction manual. In Japan in particular, the destruction of many old wooden houses in Kobe by the Great Hanshin Earthquake of 1995 (see TF 36) has only spurred on the transition to the 2x4 system and prefab housing. But these past 10 years or so have seen, in both countries, a movement toward the use of wood in three-story and taller collective housing units and other larger-scale buildings. The fact that materials processing for wood construction inflicts far less damage on the environment than for reinforced concrete or concrete-and-steel has certainly had an effect. Japan has recently joined the West in the development of large cross-section laminated lumber products, high value-added "engineered woods" such as Oriented Strand Board and Laminated Veneer Lumber, and similar products made from domestic lumber, breaking out of the bounds of traditional milling for residential construction use.

Nevertheless, the old ways of building have far from disappeared. For example, the techniques of the *miyadaiku*, those carpenters who have built and maintained temples and shrines in Japan down through the centuries, have become absorbed into the tradition of general carpentry. These days, however, because so much preprocessing work is done in a factory, it has become difficult to "see" how a building actually comes about. The open workshops have provided an ideal opportunity, then, not simply to show off the techniques themselves, but to allow ordinary people to experience firsthand the process of building, from raw materials to the final result, and to learn something about a certain kind of "wisdom" accumulated over long years of tradition. And it seems inevitable also that one should discover in this way something about the background of the people themselves, who took the same tree and derived very different means of building with it.

WELL then, let's take a look at the workshops. The first sauna, done in the Japanese timber framing style, was built in the summer of 1996 at a campground in the city of Heinola, south central Finland. The second one, built in summer 1997 in Higashidori Village in Aomori Prefecture, northeastern Japan, was done in the Finnish "log house" style.

Siberian larch was chosen as the timber for the Heinola workshop, though the roof beams of the two gable walls were made from European red pine (the typical species for a Finnish log house), slightly curved and cut in *taiko-otoshi* style (two opposing faces cut flat, otherwise left as is). In a forest filled with perfectly straight trees, it took a while before we finally found this crooked log. Because larch is more weather resistant than pine, we decided to take a chance and experiment with the possibilities of the *shinkabe* style, in which the posts and beams are exposed on the exterior of the building. But larch is also a wood that dries out easily, which leads to terrible warping and splitting. After cutting the trees, there was no time to let the lumber dry naturally. An experienced carpenter knows how to make adjustments based on the dryness of the wood in order to prevent the loosening of joints, but taking into consideration that the work in this case would be done almost entirely by inexperienced beginners, we decided to dry the wood artificially, down to a moisture content of 12 percent.

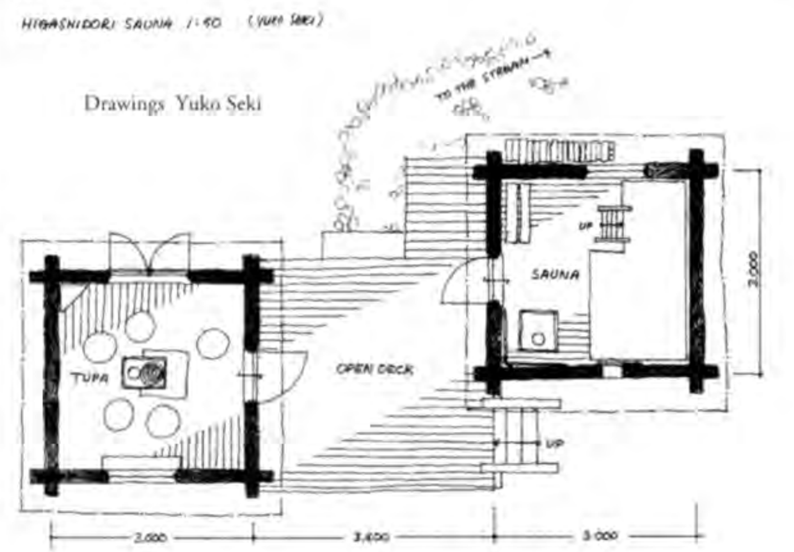
We got a lot more warping and splitting than we had imagined. What's more, the dried timber was full of knots and too hard to be easily manageable. Our Japanese master carpenter, Okuda-san, accustomed to working with clear-grained cypress and cedar, took one look at our larch and said dejectedly, "We can't use this stuff for anything but scaffolding." Sauna designer and workshop instructor Michael Anderson, in an attempt to make up for the poor quality of the material, hastily changed the size of the joint pegs

Photos Yuko Seki

The "little twins" at Higashidori in northeast Japan.

from 15mm to 21mm. In the end, though, we all somehow got used to this "wild" stuff. Or perhaps it was just that we started to feel an attraction to its strong and untamed nature, surrounded as we were by the expansive scenery of rural Finland. With 12cm-square posts standing close together and three levels of horizontal braces, the Japanese construction method gave this tiny building fairly dense proportions. And yet, if it had been given more subtle, open proportions such as one finds in the Japanese architectural style known as *sukiya-zukuri*, using fine, beautiful wood, it might have seemed out of place in this location, too delicate to withstand the harsh Finnish climate. Anderson, for whom the building's proportions were of great importance, did the initial architectural design using the ancient Japanese system of measurement based on the *shaku* (equal to 303mm, not quite one foot), and then converted afterward to metric. As a result, we got a floor plan grid standard of 910mm x 1212mm, with eaves of 910mm in depth. The Finns certainly seemed to be mystified by the bizarre numbers! Furthermore, in the *shinkabe* style, timber joints are not flush, but have a tiny (3mm or 1.5mm) offset, to allow chamfering of each member and conceal small distortions. For this reason, all of the pieces need to be sized differently by 6mm or 3mm. This offset is a key point in Japanese traditional woodworking. Known as *chiri*, it endows the joints with a subtle shadowing. In today's mass-production society, which places a high value on efficiency and rationality, it's not the famous architects and land developers who have sustained this kind of labor-intensive design, but only the carpenters in whose minds it has managed to live on to this day. (For more on this topic, see Michael Anderson's articles in TF 24, 26, 28 and 29.)

At the Higashidori workshop, the lead role was played by 50- to 60-year-old *sugi* from the nearby mountains. This region of Aomori is known for its beautiful natural forests of *hiba (Thujopsis dolabrata var. hondae)*, which has a pleasant fragrance reminiscent of North American yellow cedar. Resistant both to insects and to dampness, it was perfect for the base sill, and this time we used it also for the pillar-type foundation. *Hiba* is never used lavishly in this region on any but buildings of the highest standard. *Sugi*, on the other hand, is considered second-class lumber, to be used for studs and braces hidden from sight, and there's plenty of it to be found growing on the mountainsides. ("If yer gonna build a log house, better use plenty o'*sugi*," they would say in the local dialect.) This is another reason why the log house style was chosen for this workshop. The design consists of a 3m-square sauna plus a *tupa* (a Finnish word meaning a lounge room) for dressing and relaxing after the sauna, connected by a broad, open deck. This structure presented quite a challenge to a group consisting mostly of first-time log builders who, moreover, had only a short time in which to complete it. The sauna house came first. The tupa repeated the process used to build the sauna, except that the second time around the group had a little experience under its collective belt. It was even possible here and there to add a new feature to the design or details as we went along.

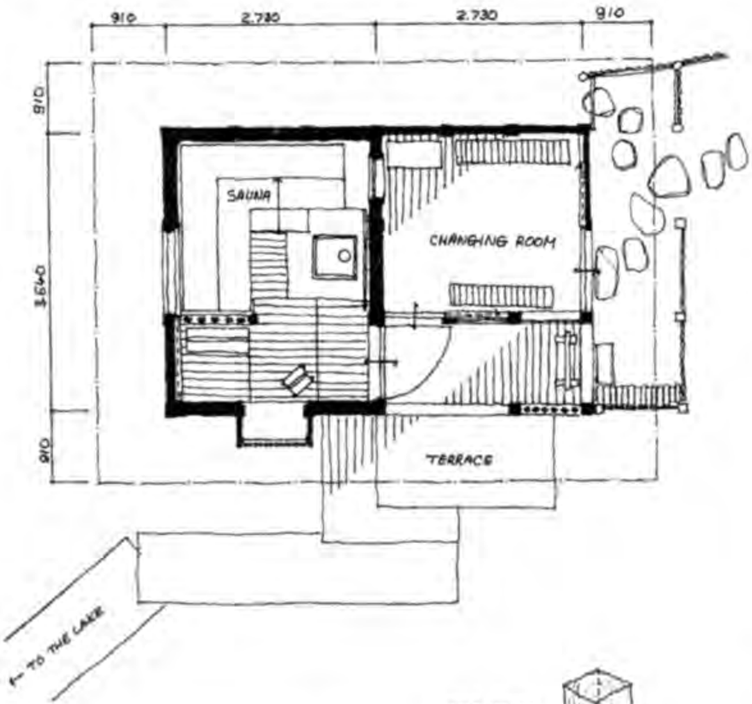


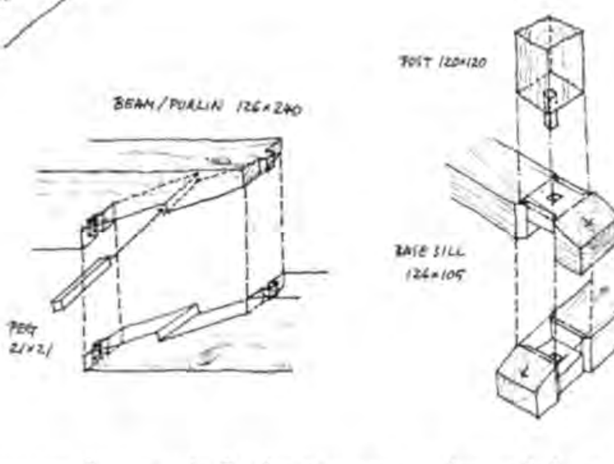
Drawings Yuko Seki

In order to simplify the use of chainsaws as much as possible, we chose a very basic saddle notch in the four corners, where the *taiko-otoshi*-cut logs intersect. The *sugi* was milled immediately after felling and we found that it contained a great deal of water. When a chisel or nail was struck in, water would come oozing out, making it clear that planes and handsaws would be useless on it. If only we had had more time, we might have been able to finish the majority of the work using a variety of axes. Still, even ordinary hand-built log houses (not kits) use green wood, and natural drying and their own weight will cause buildings to shrink gradually over months and years. Typically, 8 percent vertical shrinkage is allowed for at doors and windows, but taking into consideration the high water content and relatively low density of the *sugi* compared to pine, we figured we needed an allowance of about 10 percent in this case. To cover the 6-in-10-pitch gable roof, we used *sugi* shingles and we covered the ridge beam with naturally water repellent *sugi* bark. And now, these little twins are standing there in their solid simplicity, just as though they were at home in the forests of Finland.

THE Japanese timber frame method is noteworthy in the world for the unique tools with which it has developed: the saw and plane that are pulled toward the user (making easier the large amount of work done sitting down), the well-balanced *genno* (a wood-handled, steel hammer), and the ringed and taper-hooped tang chisel. The laminated steel-alloy blades are keen and easily sharpened, perfect for use on coniferous softwoods. Even portable power tools, made to match the typically small-framed Japanese body, are lightweight and give a good response in the hand. I've tried a number of hand-held circular saws made by the Japanese toolmaker Makita, and have found a remarkable difference in ease of

The Shinkabe-style integrated sauna and tupa at Heinola, Finland.





use between those made for the Japanese market and those made for the European market. The fact that they use 220V AC power in Europe may perhaps account for the heavier motor, but these models have also got a big, solid safety mechanism. I wonder if this reflects the serious nature for which Germanic peoples are known. The Japanese models, intended for use on-site by professional craftsmen, are made to be as powerful and lightweight as possible, with very simple safety devices. It seems never to have crossed the makers' minds that such tools might find their way into the hands of greenhorns and Sunday afternoon backyard carpenters. But, with the recent do-it-yourself boom and the proliferation of product liability laws, this will likely begin to change in the near future. In the "home center" stores, you find almost nothing but domestically made tools.

On the other hand, in the fiercely competitive European market, it doesn't pay for a country with as small a domestic market as Finland has to try to produce its own tools. At the Heinola College of Craft and Design, where I did my training, the large machines are primarily German, Italian, British, and American, while the hand tools come mostly from Germany, Britain, Austria, and Sweden. Mail order from America is quite common, and Japanese-made tools such as saws and chisels are purchased through channels in Sweden. However, if you go to a D-I-Y shop, you'll find an emphasis on Chinese and Taiwanese products, at surprisingly cheap prices. Interestingly, one can also find metalworking tools made in the former Soviet Union and Czechoslovakia which are actually quite dependable for the price you pay. Perhaps the only purely Finnish-made tools are the Fiskars-brand axes. (If push comes to shove, one can manage to build a log house with nothing but an axe.) Even in the southern part of the country, where Heinola is located, the ground is frozen to a depth of over one meter in wintertime, and the outside temperature drops to more than 20 degrees below zero (F). From the thick walls made from logs piled one on the other without so much as a sliver of space between, to the ceilings filled with densely packed sawdust and other sorts of natural insulation, the log house is truly a do-it-yourself architectural form well-suited to the conditions found in Finland's natural environment. In the old days, a man would go into the nearby forest to seek out the needed trees, fell them and haul them back home with only the help of his horse. Then he and some friends, sometimes even he alone, would spend days and weeks silently laboring over the raising of a new house.

Even today, many Finns build their own homes and saunas in just this way. With the high cost of living and high taxes in the Scandinavian countries driving up the cost of labor, doing it yourself is certainly one of the best ways to economize. The Finns also have a social system that gives them an abundance of personal vacation time, including about one month in the summer, when the days are long enough that no electric light is needed until after 10:00 pm. These factors contribute to putting their "D-I-Y capacity" head and shoulders above that of the average Japanese. That weekends and holidays are used for home remodeling and the repair of old furniture is something that's taken for granted in a country where it is not uncommon for otherwise ordinary people to own industrial-grade power tools. In every district and town, adult classes in woodworking are held at local school facilities. Even elementary schools are equipped with heavy-duty machinery, and, in addition to their study of the fundamentals at school, children generally take advantage of every chance to get hands-on experience at home as well in making and fixing a variety of things. This is worlds apart from the Japanese educational system and its excessive emphasis on cramming students' heads with information. An ecological mindset is cultivated, in my opinion, not by having a lot of knowledge and information, but rather through this sort of personal, firsthand experience.

IN the timber frame method, all the parts of the frame, marked with identifying numbers as they are produced, are transported en masse to the building site on the day of the ridge-raising. All at once, so it seems, the full frame is assembled, clear up to the roof,

Yuko Seki

The log walls, which "seem almost to embody the patient, imperturbable Finnish temperament," rise under Japanese hands at Higashidori. University architecture students joined local country folk to notch and raise the twin buildings.

MICHAEL ANDERSON has said that when one considers that the attention to detail in the timber frame construction method and its concomitant carpentry techniques rival even those of furniture making, it's as though the Japanese live in giant pieces of furniture. The movement of joints as the wood dries and contracts and the markings made to anticipate the behavior of the wood in the long run, such as the bending of beams under the weight of the roof, are examples of the many aspects of this work that cannot easily be quantified to allow mechanized processing. Indeed, the highlight of the first half of the Heinola workshop was the marking up by master carpenter Okuda of those curved logs which would become the gable wall beams. It was, after all, a similar demonstration of log markup made by Anderson the previous year at Heinola College of Craft and Design which had led to the idea of holding an open workshop on the timber frame method. The structure itself and the methods and tools used to realize it are utterly different from those of a log house.

amidst an atmosphere of festivity. The ridge beam is set, and the frame joints settled and locked in place with wooden pegs and wedges, confirmed by judiciously-placed blows of the *kakeya*, an oversized wooden mallet swung with two hands. For those participants unable to visualize how the joints they were cutting would come together structurally, the big picture suddenly comes into view in this moment, and it all makes sense. (Unless all the measurements, of the shapes of doors and windows for example, were laid out strictly beforehand, however, the work won't go well from here on out.) It looks like a big, beautiful birdcage, woven from pillars and horizontal braces. Even after the solid walls have been filled in, I still feel as though I can float softly through the gaps.

The building of a log house, on the other hand, is nothing if not a cumulative effort. Make the next log fit snugly against the one underneath, cut the notches, pile it on, make adjustments, and finally bolt it down so that it doesn't move. This cycle is repeated over and over, raising the heavy logs one after another, until the four walls have reached the proper height. Actually, the "proper" height need not be determined in advance, but might be changed at the last minute. Neither is it necessary that the final shape and size of doors and windows be fixed before the walls have gone up. At a glance you can see exactly how much work you've done that day! Looking over those log walls that have crept slowly skyward, you sip strong coffee. They seem almost to embody the patient, imperturbable Finnish temperament.

At last, it's time for the ridge-raising ceremony. All the participants, making offerings that seem somehow to suit their individual natures, celebrate the new roof, and pray for the safe completion of the remaining work. At Heinola, offerings were made of uncooked rice, sake, and salt, for purification. Each of the participants wrote his or her name on a spruce panel that was then attached to the ridge beam for posterity. At Higashidori, the offerings were of black rye bread with a hole in the middle and Finnish beer. Names were signed on a large *hiba* stump, and of course it wouldn't have been right to forget the very symbol of sauna and the wonderful Finnish summer, twigs of white birch.

"The Japanese are gonna teach us how to build a sauna?" As this headline from a special section of Finland's national daily paper suggests, the workshop attracted considerable interest among the Finns, a people proud of their culture and traditions of wood craftsmanship. In addition to the attention of the mass media and a visit from the students of an international seminar being held by the architecture department of the Helsinki University of Technology, many ordinary folk came to the work site to see for themselves what we were up to. The open workshops made a significant impact in a number of ways.

At the Higashidori workshop, participants from the surrounding area were joined by architecture students from several universities. Not only did they pound nails, peel bark from logs, cut lumber with circular saws and lay floorboards, but even in handling chainsaws and adjusting the scribers (the special dividers with attached cross-levels, peculiar to log house construction, used to transfer shapes from one log to another), they seemed to gain something by having this firsthand experience of specialized carpentry, something that can't be learned by sitting in a classroom. Through the repetitive nature of log work, the participants' skills improved noticeably, and, by the end, several of them had become quite adept at wielding a chainsaw. But these people, while they were without a doubt amateurs, nevertheless simply by virtue of the fact that they lived in the countryside, were accustomed to performing a variety of chores of a sort which are wholly unnecessary in city life. I believe they had probably already gone beyond the mere use of tools to a deeper level of understanding, in which they perceived the character of wood and were able to make use of it competently. Unlike environmental-protection-minded city people, who tend to overreact to the idea of cutting down a tree, they had a more direct and realistic relationship with Mother Nature. In fact, their quiet reserve reminded me quite a bit of the Finns.

The two workshops I describe here, though held in different places by different organizations and realized using differing methods, nevertheless shared a number of intentions. First, to make use of locally available materials, and to experiment with new ways of using these materials. Second, to study methods of wood construction different from one's own, learning both the techniques and their deeper meanings. Third, to allow nonprofessionals to participate, and to gain the experience of building through firsthand

Photos Jari Jetsonen

The "tupa" at Heinola provides a comfortable space to change clothes.

The adjacent sauna room. Stove is at far left.

physical labor. Fourth, to cooperate toward the realization of a common goal, namely "to build the best sauna possible for everyone involved." And, finally, to advance international cultural exchange between Finland and Japan.

INCIDENTALLY, are you familiar with the true sauna experience? Chop wood, draw water. Making a small fire, you heat the water. Inside, the sauna is dimly lit by the warm flicker of a single candle. A time of burning silence. You throw a dipperful of water onto the scalding rocks and in an instant, a hissing wave of heat descends upon you. You strike your reddened skin with birch twigs. If you're in Finland, you now go outside from the 200-degree sauna into below-zero temperatures. You break a hole in the ice on the lake and take a dip. Or perhaps you roll around in the fresh, powdery snow (even in Finland the latter is somewhat unusual). It doesn't have to be a Japanese timber frame or a Finnish log house. It could be American-style timber framing, or something else. Why don't you try your hand at building a sauna and enjoy it yourself?

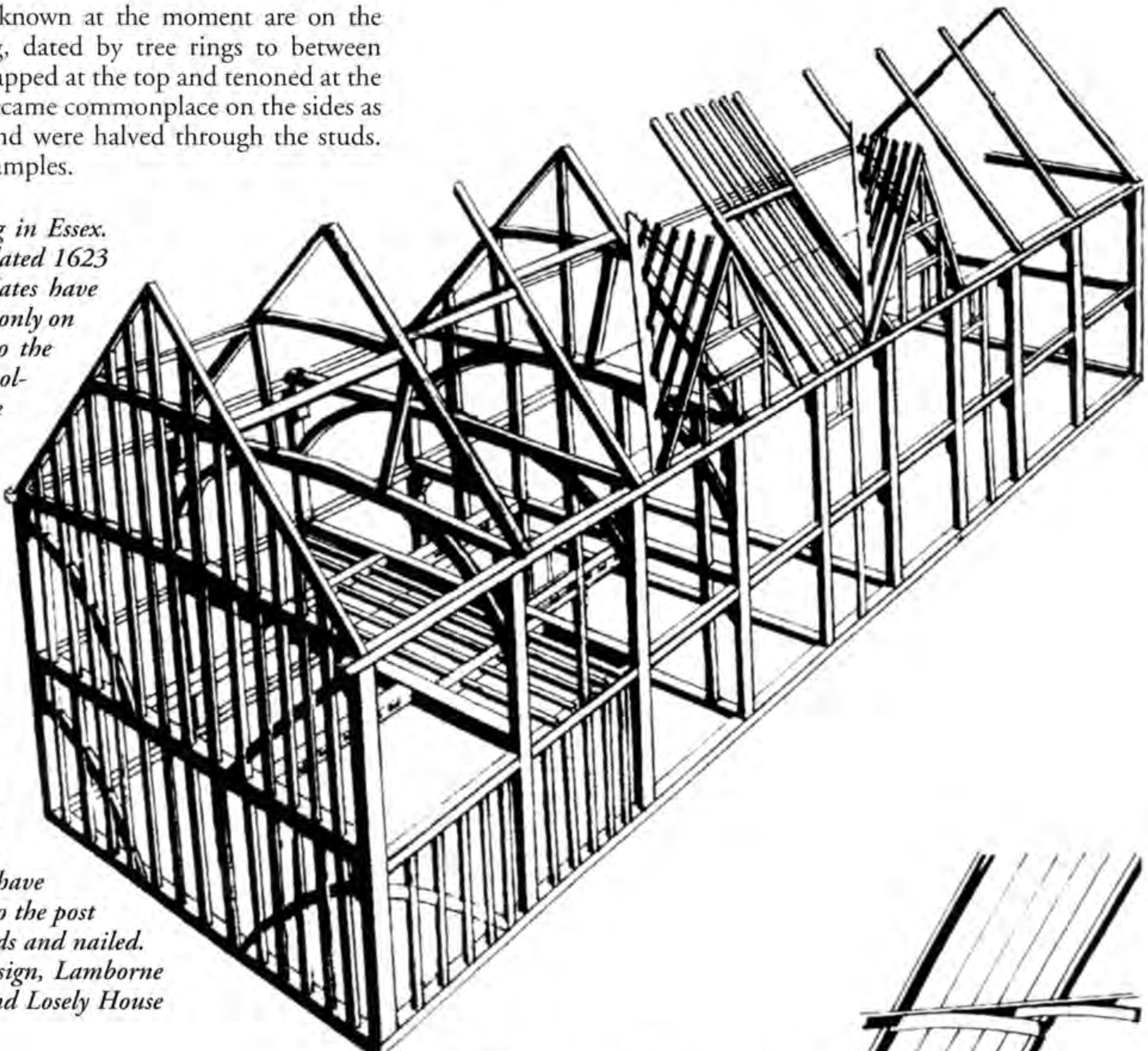
—YUKO SEKI

Yuko Seki (www.info.niigata.or.jp/~yukoseki) is a Japanese architect who spent 12 years designing buildings at firms in Kyoto and Osaka. In 1994, she went to Finland for three years to train as a cabinetmaker. This article was translated from the Japanese by David J. Iannucci (dji@radio.email.ne.jp), who took a break from computers to assist at the Heinola workshop.

The deck and porch at Heinola lead through the building. The changing room is behind the large windows, the sauna behind the screened window.

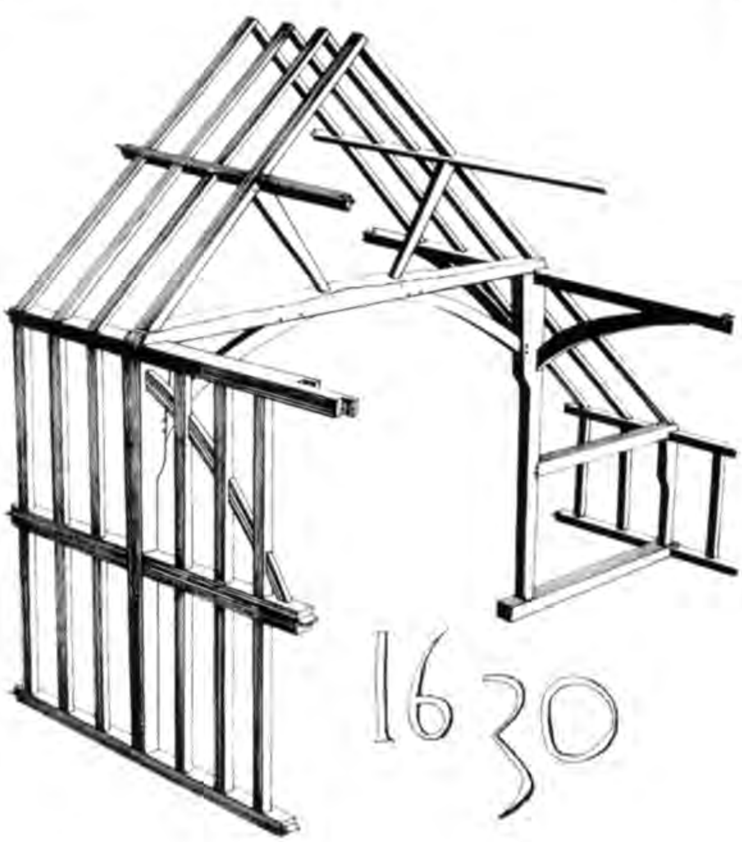
English Barns with Nailed Wind Braces

THE oldest wind braces known at the moment are on the Wheat Barn at Cressing, dated by tree rings to between 1250 and 1290, notch-lapped at the top and tenoned at the base. Later these wind braces became commonplace on the sides as well as on the ends of barns and were halved through the studs. These nine barns show later examples.

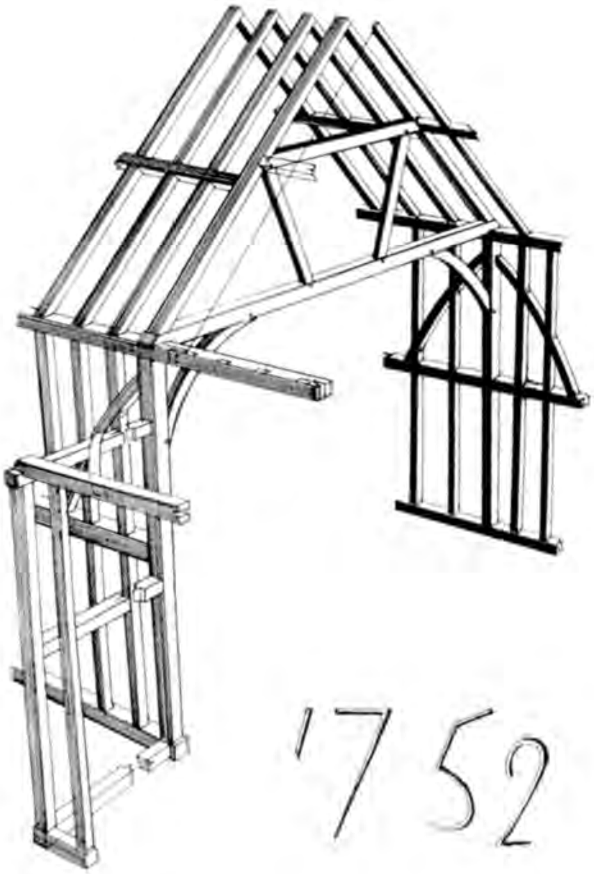


At right, The Granary, Cressing in Essex. Nine bays with two midstreys, dated 1623 (carved on the outside). Top plates have bladed scarfs. Wind braces, used only on the ends, are uncut and let into the studs and nailed. The roof has collars and raking struts, and the building has a first floor, where grain was stored in large bins.

Below, barn at Colville Hall, White Roding, Essex. Oak, five bays, a midstrey and a side aisle. Arcade posts have long jowls; one has a carved date of 1630. Tie beams and the arcade plate have slightly curved arch braces, double pegged. Plates have bladed scarfs. The roof has raking struts and middle purlins; each bay has seven rafters and seven wall studs. The walls have curved wind braces mortised into the post and girt, halved through the studs and nailed. There are three barns of this design, Lamborne Hall and Pimp Hall in Essex and Losely House in Surrey.

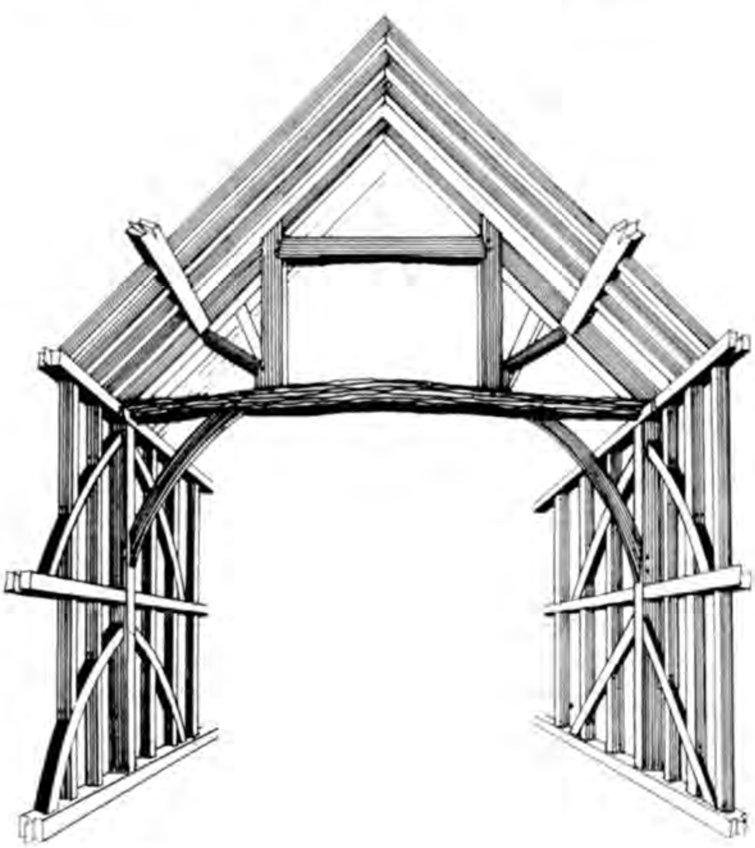


Above, barn at Sibley's Farm, Chickney, Essex. Five bays and two midstreys. Two of the bays were added in 1683 (carved "MB IB 1683"), but the original bays are not dated. The earliest bays have wind braces halved through the studs. The cross-frame has arch braces and curved tie beams. The roof has middle purlins with curved braces. Arcade posts in all bays have long jowls, and the curved arch braces are likewise apparently copied from the original bays. The roof is also copied from the earliest bays, but the wind braces are up to date.



At left, barn at Stanford Rivers Hall, Essex. Oak, seven bays with two midstreys, one top plate with a carved date of 1752. The arcade posts have no jowls. The tie beams are straight with arched braces tenoned and pegged at both ends. The top plates have bridled scarfs. Curved wind braces are tenoned to girts and principal posts. The braces are uncut, with the cut studs nailed to them above and below. The roof has collars and raking struts; purlins are joggled out of line.

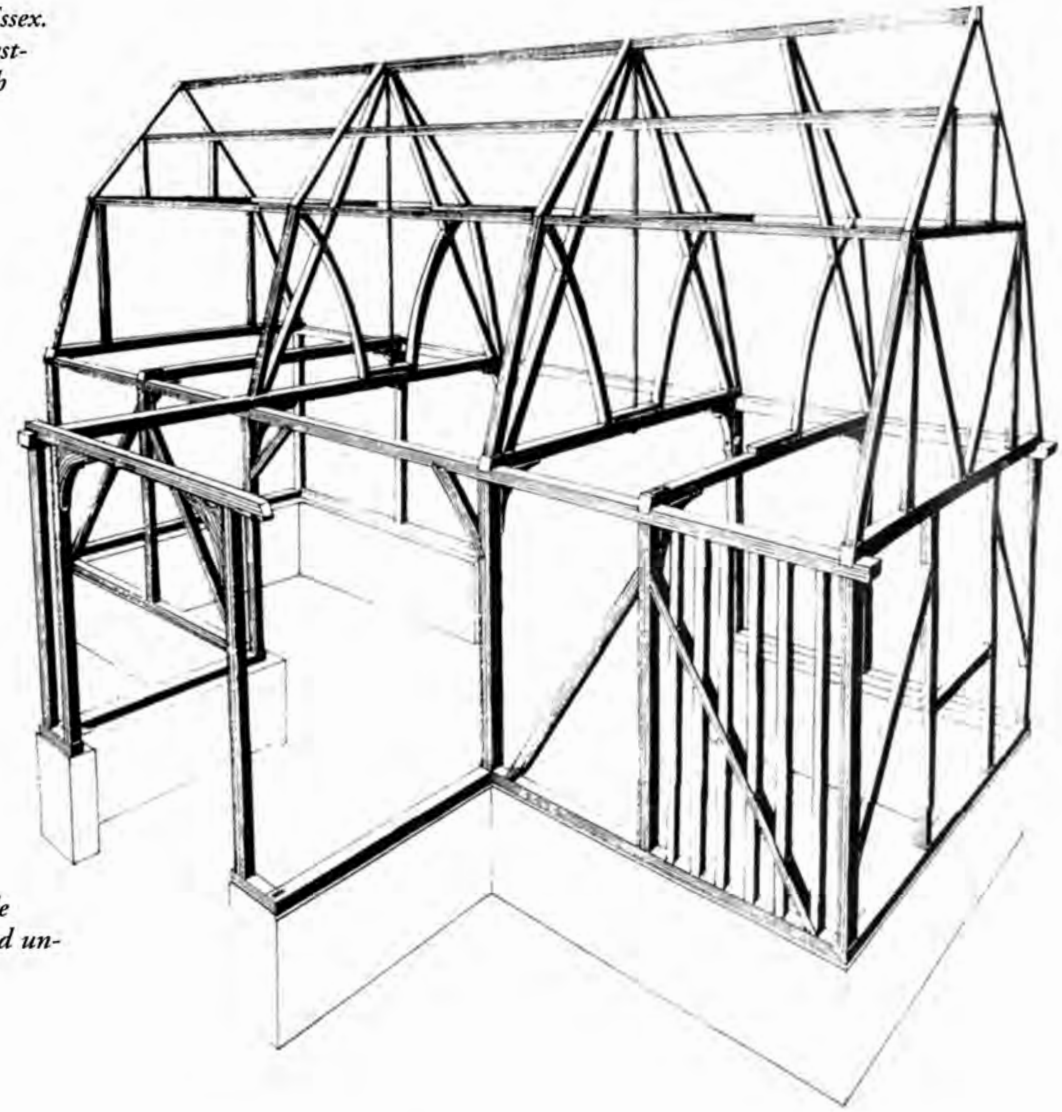
At right, barn at Porters Hall, Stebbing, Essex. Oak and pine, 11 bays. Later work is dated, carved OS 1756. Studs and posts are oak, the roof frame mainly pine. The king posts are bolted through the three tie beams. All seven common rafters are oak. Wall studs are 7 in. deep and 3 ft. apart. The tie beams are straight, and the arch braces are trenched into open mortises. The top plates have bladed scarfs. The inner principal rafters are clamped with iron straps to the tie beams, and the central (top) purlin is mortised to the top of each king post. The straight wind braces in the outside walls are set at an angle of 45 degrees between the tops of the principal posts and the girts.



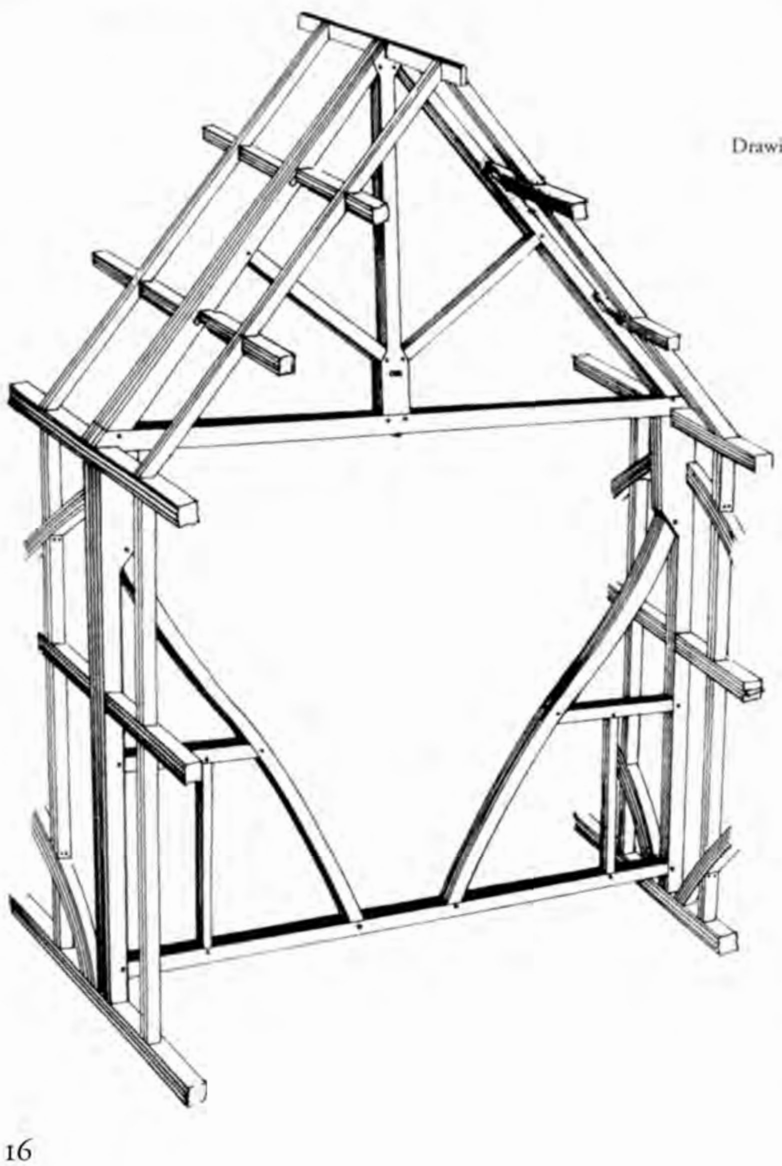
Drawings Cecil A. Hewett

At left, barn at Howlett's Farm, Navestock, Essex (arcades not shown). Ten bays with two midstreys and a red brick base. Arcade posts have no jowls. Uncut curved wind braces are oak and pine, with the cut studs nailed to them. Top plates have bladed scarfs. The roof has queen posts with tenoned collars and raking struts, and the square purlins are oak. The barn is not shown on the Essex map made by Chapman and Andre in 1777.

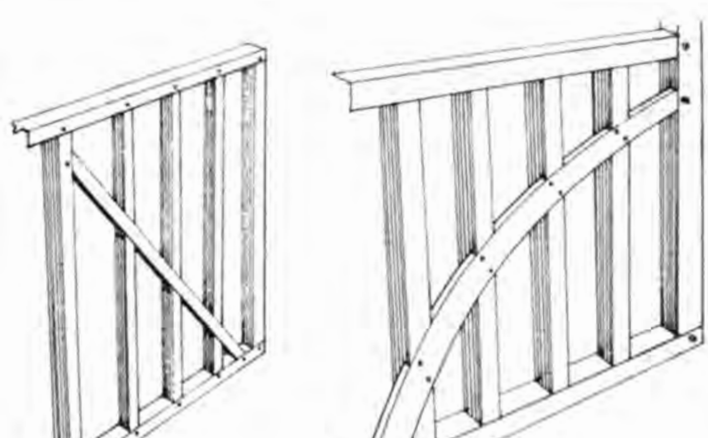
At right, barn at Sewel's Farm, Little Braxred, Essex. Five bays with a middle midstrey and an interesting roof frame. The arcade posts have no arch braces, instead being kneed, and the diagonal wind braces are uncut with nailed studs. The triangular wind braces are more important than the studs. The gambrel roof includes two trusses fitted with long iron bolts from the peak to the underside of the tie beam.



Below, barn at Rettendon Place, Essex. Pine, six bays and two midstreys on a bricked base, the only one with a different inside design. This barn is not shown in the Essex map of 1777, but the map shows Rettendon Place house. Arcade posts have no arch braces, but do have long jowls and long curved pieces from the jowls to the bottom straining beams, stiffened by horizontal struts as shown. The king post is bolted to the tie beam and also pegged, with raking struts on each side. Side purlins are joggled. Wind braces are curved and uncut with nailed studs.



Drawings Cecil A. Hewett



These last three barns are late, as they were not shown on Chapman and Andre's 1777 map. They are not dated but appear to go in this order. Finally, the figure above shows two later windbracing joinery developments following from the medieval, and strongest, arrangement of the brace and the stud halved to each other. Heavy timber barns were made until about 1890, by which time only the cheapest methods were used.—CECIL A. HEWETT

Cecil Hewett is the author of English Historic Carpentry, *recently reprinted in softcover (Linden) and available from loftybooks@aol.com.*

The Voyages of Oatman: Chartres

The Maison de l'escalier de la reine Berthe in Chartres. The expression of wealth in late-medieval France was not, as in our own time, limited to structural ingenuity alone. Ornamental and allegorical impulses were liberally expressed, as in the carving of beast and hands at right.

Photos Paul Oatman

LIVING in California, I lament the absence of historical architecture. Not that California is entirely without archi tectural heritage: witness Santa Barbara, Monterey, San Francisco and Oakland. But the Old World is a feast in comparison. Upon my completion of a long project last year, the client gave me two open-ended round-trip tickets to Europe. I closed up shop and decided to smell the roses and take pictures. My wife, Karen, came with me to Paris, and then I continued on to Germany, the Netherlands, England and Ireland. My code of travel was based on Lao Tsu's edict, "A good traveler has no fixed plans and is not intent upon arrival." After Paris, this philosophy served me well with wonderful surprises throughout my journey.

From a timber framing point of view, Paris (est. 52 B.C.) is a closet queen. In the 16th century, fire codes decreed all wooden structures be plastered over. Another 12,000 structures were destroyed from 1852-1870 to widen the streets and change Paris from a medieval city to what it is today. Yet timber framing is exposed in countless interiors throughout Paris. Au Gourmet de l'Isle, 42, rue St.-Louis-en-l'Isle, offered traditional French food along with wooden benches and exposed interior timber framing, which made Karen happy and me doubly content, with my first close look at a French frame.

Notre Dame (built 1163-1361) was more than a pleasant surprise. It instills awe in anyone who looks upon it. The walk up the

Malcolm Miller's house on the rue des Ecuyers. Miller is Chartres' resident authority on the cathedral.

Above and below, restaurants and crêperie in old Chartres. Direction of down bracing is not intuitive. Framed overhang is typical. Below left, a tower enjoys a fresh coat of paint over its plaster.

Photos Paul Oatman

tower was revealing. A door gave access to the 12-ton bell, all the supporting framing exposed in full glory: 22x22 oak timbers, iron-banded and fixed with 2-in. pegs, hard to photograph yet beautiful to behold.

The Louvre's facades and I. M. Pei's controversial glass pyramid actually complemented each other, I found. From the stairwell that descended under the courtyard, well-lighted by the pyramid, I had an original view of the baroque buildings. In the *Musée des Arts Decoratifs* section, a 30-in. *varlope* (foreplane) rested in the company of ancient carpentry tools. Ivory folding rules from the early 1800s showed on their respective faces four different scales and the

Above, the Maison du Saumon (Salmon House) and the Maison de la Truie qui File (House of the Spinning Sow). Unlike the salmon, the sow would not reveal her secret to the camera.

names Hamburg, Burgos, Paris and London. It appears that every major city in Europe then had its own standard of measurement.

After visiting as many cathedrals and museums as we could absorb, Karen would take a nap and I would stalk the city looking for timber. In the district called le Marais (4th arrondissement), I came across *Paris Historique,* in a building restored with the first-floor framing exposed. The vaulted stone cellar undercroft was accessible and incredible. A timber-framed staircase connected the floors, and the rear of the building had been stripped of its plaster, exposing the oak beam work. As this was the equivalent of the New-York Historical Society, a wealth of information could be found here, and one woman even spoke English. I would start any new search here and also visit the headquarters of the Compagnons du Devoir (inquire at 82, rue de l'Hôtel-de-Ville). A church that we missed was the 12th-century Église St. Germain-des-Près, easy enough to find on the boulevard of the same name. Cecil Hewett somewhere mentions its base-tied roof.

An hour's train ride from Paris brought me to the city of Chartres, and here I unleashed the camera. The old town was a village of the past, cobblestones and timber frames abounding. The majestic cathedral had withstood five major fires before the 13th century, then 16th-century fanaticism, 18th-century revolution and 20th-century war. It now enjoyed the attentions of British historian Malcolm Miller, who had devoted most of his professional life to the cathedral and lived right in Chartres in a 15th-century timber frame house.

I saw an astounding timber-framed spiral staircase at the House of Queen Bertha's Staircase (page 17). The Salmon House and the House of the Spinning Sow (this page) displayed their subjects carved in the timber work along with angels, vines, a butterfly and a fawn. I did in my frenzy miss the Enclos de Loes, said to be a fine 13th-century tithe barn built above a vaulted wine-cellar supported by a series of circular columns, ogival arches and crossed ribs, with the main chamber above (where the clergy stored their grain) remarkable for its timber work.

—Paul Oatman

Paul Oatman, of Pioneer, California, has been building in wood "from frame to finish, for 28 years," and was drawn to timber framing seven years ago to turn to good account an unexpected supply of Ponderosa pine logs. In the next issue he takes his camera to Germany.

Continued from page 3

all of these: that the trades are plied in the old-fashioned way using the traditional tools. Few, if any, of these pursuits bring in much money, but the craftspeople carry on, through sheer love of their work. Until a great enough demand occurs, the cooper will continue to shave his staves by hand, to cut the groove for the lid with a croze and to hammer on the custom-made hoops. Is that cooper doing more to keep his trade alive than the timber framing factory which cranks out frames and ships them to the far ends of North America? Are we doing a disservice to the name of our guild and to our workers who manufacture these products? Perhaps. Are we acting in the true spirit of a guild if we are not preserving the skills that created the barns and houses that drew us into timber framing in the first place? There seem to be many more questions than answers.

The timber framer who cuts his frame by hand cannot compete with the mechanized shop. That is the reality. The market is infinitesimally small that will pay a worker a living wage to cut shoulders with a handsaw and rough out mortises with a spoon auger. In truth, it is incredibly labor intensive to create a frame this way, and with the pressures of modern-day living, there is not time enough in the day to do it.

But try to imagine what it was like for our forebears to frame up a building. First, the frame was designed, based on what worked and what had failed before. Examples of frames that did their job abounded around the framer. Sizes of timbers, spans, species of wood were almost predetermined by existing structures and geographical location. The frame was probably sketched up on a piece of paper or a shingle, and the framers went into the woods. Knowing the sizes of timbers needed, the trees were accordingly selected for straightness and size.

The trees were felled, the limbs removed and the logs hauled to the hewing area. In every part of the process, the framers had a direct relationship with the piece being shaped, taking into account knots, twist, natural crowns of the timbers. As the timbers came out of the hewing yard, they already had their place in the frame, or, in the case of identically sized pieces, their places were quickly chosen. They were handled so many times in the process that they took on their own identities, recognized for their characteristic knots, grain and color. The layout was done with an eye for how these features affected the ultimate placement of the piece.

When the framers executed their joinery, they were directly affected by the quality of the hewing, and they were aware of the hewing marks, the squareness and the straightness of the timbers. How the wood

Continued on page 24

Continued from page 20

worked, how the chips came out of a mortise, how the slivers slipped from a chamfered tenon, all were part of the framer's daily experience. As the timbers were fitted for scribing, the framers saw and dealt with wane and irregularities in the members. A knee brace might be fitted to a waney post, and the shoulder of the brace would bevel out to hug the receiving piece. The pieces were identified by matching Roman numerals to expedite the raising process, but most of the pieces could be readily recognized by sight by the framers who had spent hours with each of them. All of this led up to the raising, the big event, but the bulk of the work had gone before.

Day by day, as the framing progressed, the men were acutely aware of the weather. The direction of the wind, the appearance of the clouds, the dew on the timbers in the morning. As they worked, they heard the songs of the birds, the cry of a hawk overhead, the murmur of the bees as they flew by. They experienced the thirst and hunger that comes from honest labor, and the water they drank was drawn from a hand-dug well, the food they ate came from the fields and trees they had planted. They were in touch with their surroundings, and they had to adapt to them. How does this compare to today?

The differences are so glaring they hardly bear mentioning. Modern life is nothing like it was a hundred years ago, and a second industrial revolution conspires to steal the legacy of hand-crafted timber frames away from us. All of the members of the Guild must have received a brochure in the past year extolling the virtues of a German-built, computer-driven timber framing Goliath. What is this? For an investment of $300,000-$400,000, anyone can be a timber frame producer. It is an awesome machine; the technology is something to be marveled at. But what is the product that is spit out of the end of the workshop? The late furniture designer George Nakashima, a hands-on woodworker who knew his wood, wrote in *The Soul of a Tree* that wood is imbued with something immeasurable, some "thing" intrinsic to it that affects how it is to be used.

Admittedly, I suffer from a bad case of idealism. I continue to hold to at least some of the ideals of my generation, and it colors and affects how I view the world. I struggled for three years with the thought of buying a mortising machine. I succumbed. My justification? Primarily to save money. Beyond that, I personally find timber framing to be tedious, and it takes its toll on me as I hunch over a mortise, craning my neck to get the right angle. I have more respect for and interest in historic buildings, and that is where the focus of my work is. For the 17 years that I have been in business, I have not wanted to be strictly a timber framer. My work encompasses everything from foundation repair to reroofing, and timber framing has been such a small part of it that I never was forced to make the decision on whether or not to tool up.

In the past, I would pass on timber framing jobs that came my way, saying that my crew and I were not geared for it, that we didn't have the proper tools to produce a surfaced frame. Rough frames are perhaps where I draw the line, and suddenly enough jobs appeared at once to force me to reexamine the purchase of a mortising machine. I held off ordering it until two days before we needed it, managing to get caught in the UPS strike and having to work around the missing tool we were already counting on.

This was last summer. Having the tool probably shaved four days from the project we were on. We all marveled at its speed and accuracy, and I managed to feel good about my purchase until Kevin, on his last day at work before he went back to graduate school for architecture, said that he wished he had had a chance to work a mortise the old-fashioned way. Kevin has worked for me over three summers, and he has made mortises in what for us passes as the old-fashioned way, that is, drilling out as much as possible and chiseling to the lines. Still he felt the need to be personally involved, to stay close to the work, to have no machine barrier in front of him.

Well, there it is. We have an obligation to preserve the old ways in some fashion. Is it up to The Traditional Timber Framing Research and Advisory Group to be the conscience of the Guild? Should a program be set up to initiate timber framers, to school them in the "old" ways before we turn them loose with machines to crank out a frame? Are these viable concerns, or the guilty musings of an old hippie? Let's call it food for thought, and let it simmer on the back burner. —Brian Murphy

Brian Murphy operates Brian Murphy Barn Restorations in Ottsville, Pennsylvania.

NON-PROFIT ORG.
U.S. POSTAGE
PAID
EAST BARRE, VT
PERMIT NO. 2

PUBLISHED BY THE TIMBER FRAMERS GUILD OF NORTH AMERICA, BOX 1075, BELLINGHAM, WA 98227