



# TIMBER FRAMING

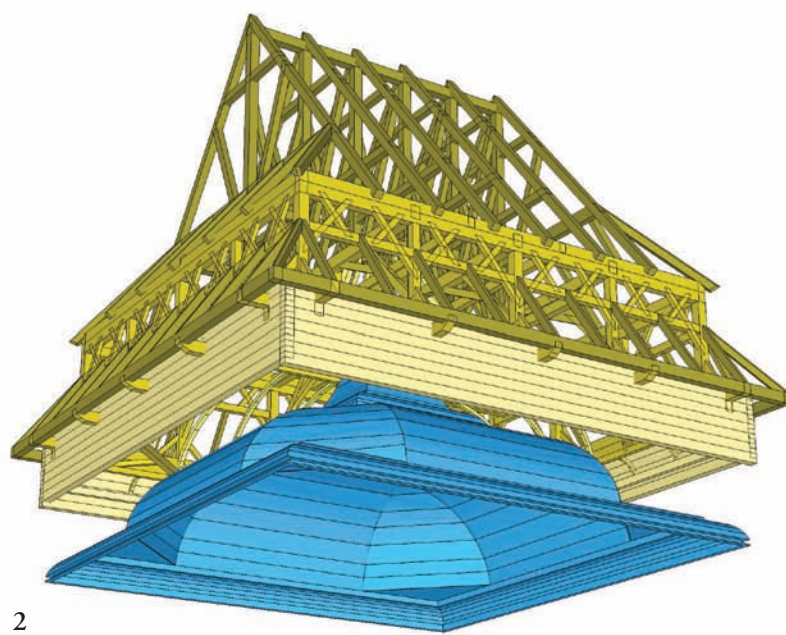
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*Raising in Warsaw*



Jacob Bach-Jensen



Ed Levin

## Raising in Warsaw

**R**ETURNING to Poland this past winter to assemble and install the Gwozdziec Synagogue replica contrasted sharply with the trip I had taken in the spring of 2011. Instead of working in the open on a lush meadow across the river from the small town of Sanok, we were inside a still-unfinished concrete and steel building in the middle of a web of Warsaw streets. Where there had been sunshine and heat, there were clouds and snow. Where there had been axes and pit saws, there were now welders, jackhammers and grinders. Compared to over 100 builders in Sanok, our group of 14 project veterans felt intimate.

The one thing remarkably unchanged was the great deal of work to be done in a very short time—a daunting prospect but a small concession, because the Gwozdziec Synagogue project is the kind of work that one fantasizes about when getting into timber framing. These three weeks were the last construction phase of this multiyear, multilayer, multientity project to replicate a large part of a lost 17th-century Polish wooden synagogue and to install the replica in the new Museum of the History of Polish Jews in Warsaw (see “A Synagogue Roof in Poland,” TF 101) to represent all the wooden synagogues systematically destroyed in the 20th century. Gwozdziec was selected to replicate for its beauty, detail and surviving documentation. The museum stands in the Muranow district in view of the memorial to the Warsaw Ghetto Uprising of April 19, 1943.

Built to 85 percent scale to fit the museum’s designated space, the frame measures 34 ft. square by 30 ft. tall, representing the top two-thirds of the original synagogue. The chief purpose of this frame, the centerpiece exhibit in the museum, is to display an elaborate polychrome wooden ceiling painted by an international group of students led by Laura and Rick Brown of Handshouse Studio and the Massachusetts College of Art, who also codirected the entire Gwozdziec replica project, ten years in the making.

Thus it was in January of 2013 that I was part of a five-person crew that returned to Poland to install the Gwozdziec frame in the museum in Warsaw. On the Guild side, I joined Alicia Spence, the project coordinator, Jim Krickler, the millwright who had managed the curved work in the frame and much more, English framer Barbara Czoch (of the UK Carpenters Fellowship as well as the Guild, and who came to fame leading the pitsawing in Sanok), and the Danish woodworker Jacob Bach-Jensen, youngest of the team, bringing with him skills of a timber framer and of a fine furniture maker. We met up also with Polish timber framer and log builder Witold Łaski, Sanok alumnus turned indispensable general contractor for this phase of the project.

Touching down at the same time were Rick and Laura with their dedicated crew of four ceiling artists (*painters* does not quite do them justice). Rounding out the crew were Olga Micińska and Ania Sikiera, two Varsovian volunteers who had been part of the effort in Sanok and were happy to contribute again.

Right away we were warned about the Polish hoops we would be required to jump through on our first day—workers’ rights education, safety instruction and a health exam. All of which we honored, though not without growing impatience, for we were itching to see the site and touch the timbers. The site proved an unfamiliar environment for most of us, a huge, and at first glance severely modern, edifice still under construction, in the middle of a big city, completely fenced off, underground, surrounded by metal and concrete, immersed in dust and noise from other trades. But all the timbers were there!—somberly draped under black landscape fabric at the edge of the dim cavern (Fig. 1).

It took a day and a half to sort out the nitty-gritty of staging areas, light and power, and navigating the halls and stairways. Getting to know the people we were to work with and figuring out communication took a bit longer.

**Assembly** For practical purposes, we who built the frame had divided the structure into three sections, which can be distinguished in Fig. 2. The lowest (light yellow) was the partial walls 30 ft. 6 in. square, 4 ft. 2 in. tall and 6 in. thick, hewn of square tapered logs laid alternately to finish level, with dovetail corner joints. Crosspieces sandwiched by the top layers hold the outboard flying plates and cornice, and sills for what we called the box frame.

The box frame (dark yellow) forms the next stage, 28 ft. square and 7 ft. 4 in. tall, made of hewn and pitsawn timbers with mortise and tenon joints as well as many, many half-lapped half dovetails. Above the box frame rises the roof system, comprising a central roof truss over 17 ft. tall and six rafter pairs each with two collar beams and struts (olive).

The ceiling (blue in the figure) has four levels: the cove, the main dome, the zodiac level and the lantern. Geometrically patterned trim pieces cover transitions between levels. The ceiling boards, generally about 7 in. wide, are hand planed and hand painted in glorious colors. The shape of this ceiling takes inspiration from tents introduced to eastern Europe in the 16th and 17th century by the Ottomans during their many military campaigns. The most elaborate of these tents, made of rich tapestries, were used for the Sultan’s court, but also for prayer.

Those who have worked on Guild projects know that when you have to break out the lights after dinner, it's crunch-time. Well, it was day one, shortly after breakfast, and we had brought out the lights. We had 16 workdays to assemble a frame of about 500 pieces, make all the necessary corrections for the twisting and shrinkage that had taken place in a year-plus of storage, scribe and re-cut some of the ceiling curves, make preparations for the structure to be suspended from brackets in the ceiling, and hoist the whole thing off the floor. And we were already down one day thanks to the Polish hoops.

While the squared logs for the base walls had grown much lighter in the past year and a half, we still needed mechanical assistance to handle them, and Alicia had found us an awesome little crane that rode elevators and worked quietly on electricity (Fig. 3). It came complete with a stone-faced crane operator named Woytek.

We noticed immediately that a dry timber in a stack does not look nearly as twisted as when extracted and set up for assembly, but the redeeming property of these long skinny pieces was that they could be wrangled with clamps and levers and subsequently held by structural screws (Figs. 4–6). In this manner we moved along without having to do too much kerfing or paring of joints. The top of the log walls included many half-lap notches, which made us a bit nervous in prospect about the fits of crossing or joining pieces. But our concerns proved excessive, for shrinkage had provided extra space in the joints for twisted shoulders.

Relieved at having arrived at the top of the hewn-log walls in the allotted time, our anxieties shifted to the box frame with its many tight fitting joints. Fortunately there was not enough time to fret, so we simply found all the pieces (not one missing!), worked our way into a new numbering system (different from the log walls) and started putting pieces together. There were minor wrinkles in the assembly, yet these box frame walls were a lesson in the virtues of redundancy. Plenty of braces ran in all directions from the posts. Our Polish volunteers Ania and Olga were all over this puzzle and few amendments needed to be made. If there was an occasional loose joint, or one too tight that had caused a fracture, we took five steps back and looked at the whole (76 joints per side), to realize it would be just fine. Top plates were on before lunch on day five (Fig. 7).



Jacob Bach-Jensen, also at left below and at bottom



Gerald David

1 Space provided for replica in Museum of the History of Polish Jews, Warsaw. Concrete floor two levels below grade is surrounded by covered stacks of timber. Glass enclosure, at entry and street level, with steel railings, surrounds opening in mezzanine while new sheetrock just beneath hides 30mm-square beam of concrete and steel. Anchors for suspended structure (nine showing in photo) are fastened to underside of beam.

2 Structure was built in three sections: log walls (shown in light yellow), box frame (dark yellow) and roof frames (olive). Polychrome ceiling boards (shown monochrome blue for simplicity) were prepainted on sawhorses, with transitions and touch-up done in place.

3 Small electric-powered spider crane proved invaluable, soon trapped itself inside building.

4–6 Twisted members were legion after 18 months storage unrestrained, yet generally yielded to clamps and fasteners.

7 Compared to the slow rise of the refitted solid log walls, the timber-framed box assembly swiftly created a big volume. Crane is now captured inside rising structure.





8 Gerald David



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Other photos this spread, Magda Starowiejska, staff photographer, Museum of the History of Polish Jews, Warsaw

By the last day of the regular workweek, the ceiling crew had completed the photography of the painted panels in our staging room and were antsy to start putting them into the frame. Jim had installed the cove ribs that give shape to the lowest part of the ceiling (Fig. 8). With the ceiling crew soon to be installing the first painted boards on the lower cove we needed to keep ahead of them (Fig. 9).

**Truss lift** We spent most of a morning with preparations for the biggest lift of the raising. The ridge truss, which would support the peaks of the rafters, had been assembled flat on top of the box frame and was to be carefully tilted up with the crane. Alicia had done the calculations, expecting the crane to hit its limits in extension as well as weight. By noon a small crowd of spectators had gathered at the glass enclosure above us on the ground level of the museum. They too wanted to witness the ship-in-the-bottle feat that we had told everybody we could do.

In a slow and deliberate process including two fully planned riggings, one with the truss nearly vertical, we stood up the ridge (Figs. 11–12). Having been deprived of a complete raising in Sanok we now for the first time got an idea of the full height of the roof. (Alicia quietly asked Jacob to measure the remaining space between ridge and ceiling.) With everything tied off and braced, and a huge psychic weight off our shoulders, we went to a late lunch and looked forward to our first day off. It turned out to be a short day. Even those of us who did not have to accommodate jet lag needed the rest. We made sure to visit the castle and see the old town, though. Monday showed up predictably quickly.

**First frame lift** Before we could continue with the roof we needed to lift the entire frame. The now trapped crane was needed on the outside to hoist the rafters and a scissor lift now needed inside for ceiling work. Hanging the rigging proved to be much slower than expected. The design (by Mike Beganyi and Alicia) clashed with the reality of nonconforming metal fabrication, and tight quarters did not help. While three people took turns grinding metal shackles to make them fit ceiling hangers, Jacob and I drilled sixteen 1¼-in. holes through more than 50 in. of log walls, to accommodate the permanent suspension rods. That took a day and a half (Fig. 10).

Alicia and Barbara satisfied themselves with the rigging: eight massive yellow chain hoists each with bright-red 5-ton straps and 10-ton load cells that measured real-time readout on the load of that particular hoist. Not only the rigging nerds were excited. Alicia hollered “Ten pulls!” or “Another ten!” and the chains rattled, the straps tightened and the frame lifted off the cribbing to sway gently to and fro (Fig. 13).



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8 Cove ribs installed and ready for first ceiling boards.

9 A partly visible Laura Brown lying on floor tightening gap on lower cove board while Jason Bashaw fastens it with screws.

10 Author, left, and Jacob Bach-Jensen use guide designed by Alicia Spence to drill long holes for suspension rods.

11–12 Spider crane at work inside frame lifting central truss that will support rafter peaks. Two successive rigs were necessary for lift.

13 Liftoff! Witold Łaski was one of eight pullers, each on a mechanical chain hoist, spread around the structure.



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This page and below right, Magda Starowiejska, staff photographer, Museum of the History of Polish Jews, Warsaw

What a marvelous thing! A quick tally of the load cells revealed a preliminary weight of just under nine tons. A later tally with most of the ceiling installed and all the roof timbers yielded a weight of around 13 tons, to which some sheathing and wooden shingles were to be added. Eventually the weight to be carried by the rods would be in the range of 15 tons (the design weight was double that). We then took the opportunity to test how the frame reacted to being lifted unevenly, a likely case in the final lift. Our experiments brought next to no complaining from the frame and our pride in it only grew (Fig. 14).

**Raising the lantern** We celebrated the achievement that night but stayed mindful of our schedule, so the following day (our ninth) we freed the crane and trapped the scissor lift, which would be the next piece of equipment to be tested to its limits. The lantern, the topmost part of the ceiling, needed to be raised. The frame had become too congested with timbers for the crane to operate on the inside, and it did not have enough reach to use from the outside. But there was plenty of room in the center of the structure for a straight shot up! The lantern, which, unlike the rest of the frame had never been dismantled, took ten people to heave it onto the scissor lift. Then it was on its own. I had my doubts, but Alicia shrugged and said it would be fine. It was. Though scissor lifts don't usually make that much noise (Fig. 15).

The ceiling ribs now became the priority, so all hands jumped on getting them amended and installed. Then, coming from left field, we got the biggest scare of the project. At the end of day eleven, a Friday, after working for hours in noxious fumes coming from a museum crew using two-part epoxy paint a scant 80 ft. away, we were told that work was stopped for the weekend because of the fumes, and continuation on Monday was uncertain. Of the five days left to us, two looked likely to be scratched, rendering what had been a tight schedule nearly impossible.

That almost took the fun out of a Saturday off. The Guild crew got to explore Warsaw with the help of Olga, while Rick and Laura fought battles with the site supervisor and the museum over rescheduling the paint work, turning on the air-handling system and opening all doors to ventilate. By dinnertime we had word that we would be allowed to resume work the following day, to make up for time lost. I was not the only one to remark on the oddity of feeling thrilled to be working on a Sunday.

But this meant that we had the jobsite truly to ourselves. There was cold fresh air coming from the stairwells and we got to it with a sense of determination. The crew worked to put together the rafter assemblies, leaving the "inside" for the ceiling installers to work freely. Jacob, who had assumed his usual position on the ridge, later remarked that there were five levels of people working on the frame: him on the top, Jim and Alicia on the collar beam

level, Barbara and I on the tie beam level, ceiling crew on scaffolding and on the ground. Meanwhile Ania and Olga circled the building installing lower rafters down to the flying plates. The famous “projects flywheel” hummed contently. We got a lot done.

The roof frame complete, a wetting bush appeared at the gable peak and the focus shifted back to the inside. Jim, having completed the main dome ribs, moved up the ceiling to the zodiac curve, which connects the main dome with the lanterns.

**Ceiling boards** Rick, Laura and crew had been putting up pre-painted ceiling boards at an amazing rate. Every peek inside revealed more completed animals, in startling color, which just a little earlier had been in slices on sawhorses (Fig. 16).

Pitching in, Jacob and I installed a single course of patterned trim board on all four walls, creating a continuous pattern along the bottom of the lower cove. We quickly realized the extra level of precision and therefore anxiety involved in cutting and fitting precious hand-painted patterned boards. The boards came together without too much trouble and the parts grew into a whole. Fewer and fewer spots remained through which to poke one’s head and catch a glimpse. The complicated negative space above the pendentives, the triangular corner pieces of the eight-sided dome, turned into a kind of attic (see front cover).

14 Rafters now applied to central truss, frame now well advanced, resting on cribbing, still rigged for further lifts.

15 Genie scissor lift provided the easiest way to raise the heavy lantern, already boarded, into place.

16 Rick Brown (at right), Jason Loik and Matt Jeffs (white hat) install boards for main dome, a continual negotiation between lining up painting subjects and fitting geometry of frame.



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Jacob Bach-Jensen



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We were on the home stretch, making more trim pieces to cover the transitions in the ceiling coves and reshaping more ribs, sweeping the floor, collecting surprising amounts of scrap wood, sorting out tools and packing them for our next day's early departure. Ten halogen lights threw up thousands of lumens through the scaffolding, reflected back as a technicolor wonderland (Fig. 17).

At 7 o'clock, a tired Laura Brown somewhat reluctantly called the day. The film crew needed to get inside and make their final shots of the completed ceiling. It took the dismantling of scaffolds to get the painters to quit. Already everyone was spending half the time looking up. Alicia brought out a bag with candles and handed them out, musing about what the ceiling would have looked like "way back then." Some started lighting candles, others found switches for the floodlights. Soon we were holding up our candles and looking and cautiously questioning. Is this how they saw it?

Cary Wolinsky, the senior cameraman, who together with his son Yari had been filming this endeavor for the past three weeks, calmly told us to give our eyes time to adjust. As our pupils opened and the candles appeared to brighten, the ceiling lost its dark spots and flowed together. An incredibly bright and busy set of panels under halogen light transformed into a warm tapestry. Eventually everyone simply stood still. As much from exhaustion as from humility and respect and wonder, we sat or lay prostrate on the floor (Fig. 18).

**Completion** We were no longer on a construction site but in a solemn space of spirit. I could imagine the *bimah*, the raised platform from which the Torah is read, in the center, as it would have been in Gwozdziec, and the ark for the Torah on the east wall. For millennia, groups of worshipers had gathered around the Torah and the Torah would be carried around them at the end of the service, accompanied by an age-old Hebrew verse. History was alive.

Wonderful things have come from this project, some intangible, like learning and teaching, friendship and confidence. And many people's hands and hearts have touched this frame. I am honored to have been one of them.

—GERALD DAVID

*Gerald David (gerald-david@hotmail.com) is the founder of GFD Timber Framing in Plainfield, Vermont, and currently builds log houses at the Wooden House Company in Wells River, Vermont.*

*Alicia Spence, project coordinator for the Guild, returned to Warsaw in March to see to the suspending of the structure by its permanent tension rods. Her report:*

GUILD and Handhouse crews wrapped up the project in January with the frame still hung on rigging and cribbed at the corners about 5 ft. off the floor, some 6 ft. lower than its ultimate position. This pause was planned to give headroom inside the glass box above for the roof shingling crew to maneuver. I returned to Warsaw for a few days in March with Joel McCarty, the Guild's executive director who had over the years managed the administration of the Gwozdziec project, to orchestrate the final lift and attach the hanging hardware. This trip felt a little melancholy, like visiting a gold rush ghost town. All was quiet (relatively speaking).

Preparation and calculation for lifting a design weight of 30 tons had been done and the rig tested. What remained was turning some bolts and many, many trips up and down a ladder. First we installed all 16 of the 24mm hanging rods through the predrilled log walls (see Fig. 10). With the help of local volunteers, we then hoisted the frame to full height and attached each Pfeifer tension rod to the anchor plates secured to the bond beam in the mezzanine floor. Finally, we added a pair of 20mm sway bars to each side. All associated components such as fork ends and barrel adjusters were off the shelf. The ridge rests comfortably now several inches below the finished ceiling. No more sleepless nights!

A note on rigging. Many schemes and tools were presented for

levitating this little gem of a structure, among them Tirfors (griphoists), hydraulic hollow rams—and hiring a house-moving company. The trick to rigging is to find the simplest, cleanest route. We found it in the five-ton chain hoists. They were easy to install, readily available and allowed us manually to adjust each position up and down, giving us the ability to lift evenly within a quarter-inch. Jim Kricker brilliantly suggested we add a lifting point to the ceiling anchor plates. By doing so, and by skewing the slings slightly at each pick point, we were able to keep all hoists in tension with room to thread in the hanging rods. To proceed with painted dome installation while leaving the rigging in place, we intentionally trapped the lower slings and later, with regret, cut them to strip the rigging.

I'd like to give special thanks to the staff of Warsaw's Museum of the History of Polish Jews, most especially director of exhibits Robert Supel and his administrative dynamos, Łukasz Adamski and Agnieszka Szling. These remarkable people guided the multi-year project through bureaucratic halls of crazy built on both sides of the Atlantic. It's also important to thank Irene Pletka of the Kronhill Pletka Foundation ([kronhillpletkafoundation.org](http://kronhillpletkafoundation.org)), who donated specifically for this project, in what she said was her very first bricks-and-mortar philanthropic effort. The wooden synagogue replication project was commissioned by the Association of the Jewish Historical Institute of Poland ([szih.org](http://szih.org)), an NGO dedicated since 1951 to preserving and commemorating the history and culture of Polish Jews and their contribution to global culture. The Association was responsible for development, implementation and financing of the Core Exhibition at the Museum of the History of Polish Jews.

*Laura Brown, codirector of the Gwozdziec project, attended the limited opening of the museum in April. Her report:*

THE ceremony on April 19 was amazing, a very moving remembrance on the 70th Anniversary of the Warsaw Ghetto Uprising, followed by thousands of visitors to the museum in the next two days. For now, the timber-framed roof is the only part of the Gwozdziec replica to be seen. The painted ceiling, which must be viewed from the lower level, will not open to the public until next year. So the roof is now famous—over 7000 visitors saw it on April 20 and more than that on April 21. I watched as groups of 30 and more were guided and told the story of the roof in different languages, mostly Polish and English but also Hebrew. The roof is indeed beautiful. The Finnish architect of the museum, Rainer Mahlamäki, loved its relationship to his very modern building. It emerges from the floor of the main entry, the first thing everyone sees after entering (see back cover).

What's more important is that the roof and ceiling were made by some 290 people working for the love of learning and sharing skills and recovering a lost historical building. That story is what needs to be remembered now that the roof and ceiling are so alive. The object speaks for itself but the way it was made must be told to the world.

17 View looking east into cove and lantern at top of ceiling. Short names are signs of zodiac, identified in Talmud with months of Hebrew calendar. Clockwise from right: Nisan (Aries), Iyar (Taurus), Sivan (Gemini), Tammuz (Cancer), Av (Leo), Elul (Virgo), Tishri (Libra), Heshvan (Scorpio) and Kislev (Sagittarius). Long text at bottom of picture is part of series of aphorisms that runs continuously around cove.

18 Completed ceiling illuminated by candlelight and admired by exhausted crew including transparent Jim Kricker at center and raising boss Alicia Spence at right.





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Above, Jacob Bach-Jensen; below, Gerald David



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Laura Brown, Handshouse

