



1 The château at the start of the project. Note temporary scaffolding.

Images by Hank Silver, except where noted

# Building Bridges with Charpentiers Sans Frontières

**T**HE organization Charpentiers Sans Frontières (CSF), or “Carpenters Without Borders,” unites carpenters from around the world to execute ambitious building projects using historical tools and methods. This international fraternity is committed to the preservation of not only our built heritage but also the skills and know-how needed to create and restore this heritage. The organization is the brainchild of François Calame, a self-described civil servant in the French Ministry of Culture. François holds a doctorate in ethnology, focusing on historic wooden architecture and historic carpentry tools and techniques.

This past September, a crew of some 60 volunteer carpenters from 11 countries converged on the Château d’Harcourt, a fortified castle in the Eure department of northern Normandy. The château is the ancestral home of the powerful Harcourt lineage, and has undergone numerous renovations and additions over its thousand-year history. It was originally constructed in the early 11th century by the descendants of Bernard the Dane, likely a companion of the Viking chief Rollo, who took control of the area in 911 and who is known as the founder



2 CSF founder François Calame and crew member Mohammed Camara work with a 17th-century Swiss four-handed plane to smooth a guard-rail timber.



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3 The courtyard full of activity.

4 Loïc Desmonts & Will Gusakov sight parallels across a log.

5 Four-man crew working on a single log. The two crew members at ground level are alternating strokes on the same notch—a traditional German technique.

of Normandy (“Norman” is cognate with Northman, in reference to the Scandinavian occupiers). This early structure was an earth-and-wood fort consisting of an outer courtyard surrounded by a dry moat, earthen ramparts and timber stockades. Within the stockade, an inner courtyard, surrounded by its own dry moat, was the site of the seignorial dwelling, likely a timber building. In the middle of the eleventh century, this same family (who had become known as Harcourt) raised a three-story stone Romanesque keep in the inner courtyard. During this same time, Errand d’Harcourt rode into the Battle of Hastings at the side of William the Conqueror. Errand’s nephew, Philip, became the Chancellor of England and then the Bishop of Bayeux. The Harcourt family’s ascendant prestige led to numerous additions and renovations to their château over the centuries—the outer courtyard was protected with massive stone walls complete with towers and fortified gates. The château dwelling was enlarged and updated several times over. Eventually, in the 17th century the château was modernized to be a comfortable aristocrat’s mansion, and part of the inner dry moat protecting the château building was filled in to allow for easy access and expansive formal gardens. Despite these changes, much of the original layout of upper and lower courtyard, along with their dry moats, and parts of the 12th-century keep, are still clearly recognizable today.

An important strategic asset in the region, the château saw many battles in the Medieval period, including during the Hundred Years’ War when control of the castle repeatedly changed hands between the French and English. Following the French Revolution, in the late 18th century, the castle was essentially abandoned and fell into disrepair, finally being taken over in 1828 by a succession of public entities. Today, the Château d’Harcourt is owned by the Eure Council, the regional governing body, which keeps the buildings and extensive grounds open for public visits.

The task at hand for CSF was to reconstruct the 77-ft. wooden bridge spanning a dry moat and connecting the château building to the outer courtyard. The bridge is supported by abutments at each end, and midspan by way of an enormous stone pier, dating to the early Medieval period. The design of the original structure can only be conjectured, though it is believed that it may have been a drawbridge. The most recent iteration of the bridge had been poorly conceived and had not lasted thirty years before succumbing to decay. The new bridge design was to incorporate several strategies intended to resist rot—timbers free of sapwood, lead flashing capping all timbers, and bolt-and-plate stainless hardware in lieu of mortise and tenon joinery, as water had pooled in mortises in the previous build. This last detail was contested with the design firm to no avail. Prior to our arrival, “local hero” and foreman, Rémy Desmonts, along with a small crew of locals, demolished the existing bridge structure. A crew of restoration masons erected scaffolding from the bottom of the moat to the height of the deck and restored the tops of the cut-limestone-block abutments in preparation for the new timbers.

When we first passed through the main gate of the now-crumbling fortifications that surround the château and entered the grassy courtyard, we were met by a collection of slumbering giants: massive French oak logs (*Q. robur*) filled the courtyard, arrayed expectantly on cribbing. The logs had been procured from the large forest on the château grounds and felled by hand by CSF members the previous February.

The bulk of our work on this project was the conversion of these logs into square timbers. The diameter of the logs was far larger than necessary to yield the sections specified on the plans (the carrying beams were specified at 10 in. x 14 in., while logs were as big as 30 in. at the butt), but the engineers (more about them later) had insisted that all beams be completely free of sapwood. Using a multi-national variety of axes, our crew hewed all of the beams from these oversized specimens—ultimately producing 16 stringers, 12 arch braces, and two 6x8x38 timbers that were subsequently pit-sawn along their lengths to create four pieces for the bridge’s handrails. The mountains of wood waste left in our wake were collected by the château’s grounds crew, who chipped them into mulch to be dispersed in the gardens and arboretum near the manor. Hewing copious amounts of waste from large, knotty, French oak logs is tiring work, and all were thankful to have a large group of carpenters willing to take their turn.

Hewing methods varied according to personal preference and, to a lesser degree, national origin. Each team would first size up their specimen, and determine how best to orient the 10x14 section within the log. Plumb and level axis lines were established on the ends of the log, and the timber section was drawn out. Logs were debarked, at least locally where the dark bark would obscure the chalk line—though many preferred to peel the entire log, thus avoiding the dulling of their edge tools on any grit the bark may have contained. Carpenters would crouch down at either end of the log, each holding a straightedge along the layout line of a given face. By sighting across the two straightedges, the team would determine if their layout lines were in wind with each other across the log’s length. Once wind had been verified, chalk lines were snapped to establish the plane of the face to be hewn along the length of the trunk. Care was taken to make sure that the chalk lines themselves were held in plane with the straightedges when being snapped, as any deviation could cause the line to rise or fall out of plane. If logs were too curved to achieve a single clear snapped line, a level was used to transfer the hewing plane from the taut, level string line to a few intermediate points along the trunk, and then chalk lines were snapped along these shorter sections using the same care described above.

With one plane established, the team would score the log to the snapped lines. Most preferred to cut down to the line with one of the two-person crosscut saws on hand (known in French as a *passe-partout*—meaning “master key” or literally “goes anywhere”). Some would simply grab an axe and chop v-notches at intervals along the log. At first, most carpenters spaced their scoring cuts 12 to 16 inches apart, but most of us quickly learned that it was well worth the extra effort at this stage to score every 6 or 8 inches, or even every inch or two around large knots—extra work with the saw saved thousands of extra axe swings while juggling. If scoring with an axe instead of saw, cuts could be made at greater intervals as the v-shaped notch from an axe cut wasted more material and made billets easier to split off during juggling. Whether using a saw or axe, the scoring was usually done with the work surface level, fresh from the layout process. One of our crew had arrived directly from a hewing project in Germany, and demonstrated a German method of axe-scoring in which the timber is rotated 90 degrees until the laid-out surface is plumb. Then two carpenters, standing on the ground in front of the



6 Rémy Desmonts, the project foreman, juggles with style.

7 A phalanx of *passe-partouts* (two-person crosscut saws).

8 Three sides hewn—note hand-forged log dogs.



Will Gusakov



9 The finishing stage requires the use of a shorter-handled broadaxe. Many patterns were on hand.

10 Gustave Rémon with his Norman-pattern *doloire*.

11 An international sampling of hewing axes.

12 Loïc Desmonts cleanly chops a tenon on one of the braces.

13 Braces bearing on corbels in the original masonry piers. The corbels themselves are large chunks of iron ore.

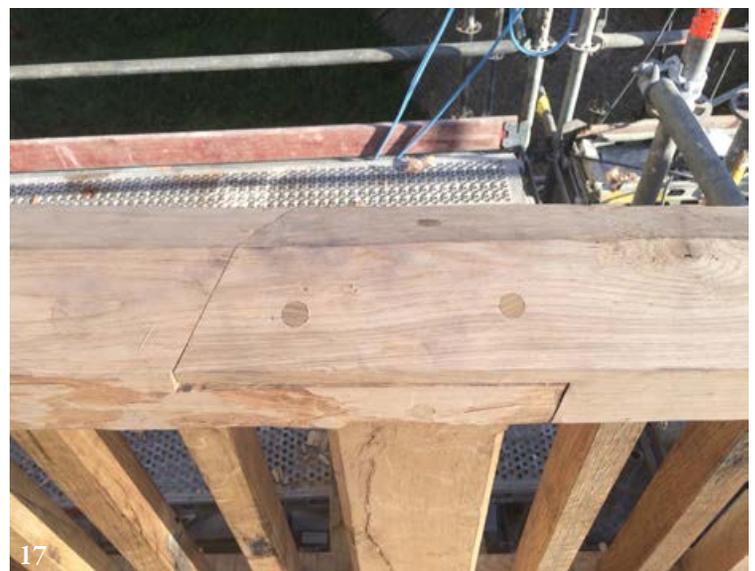
14 A collection of hand tools in use on the site.

face to be hewn, alternate axe swings while cutting a v-notch plumb down the side of the timber! The method takes a great deal of skill and coordination to accurately cut plumb without a clear view of the bottom layout line, but our crew member insisted that the German carpenters had managed the task quickly and accurately.

Whatever the scoring method, the final result was a scored log rolled 90 degrees, with the laid-out and scored surface plumb. The billets were then removed, typically while standing atop the log, using a long-handled French carpenter's axe (in French: "*hache d'éclatage*," purpose-made for juggling), though some American-pattern felling axes were used, and even a few splitting mauls around stubborn knots. An Estonian carpenter preferred to juggle with a felling axe while standing on the ground working alongside the log. Wood chips under the log served to protect the axe from hitting the ground, and his example was attempted by others on site. Emphasis was put on juggling to within three-eighths of an inch of the layout lines, to ease the finishing stage. With the bulk of the material removed, the hewers would then pick up one of a massive spread of broadaxes to carefully hew down to the line. It was at this stage that personal preference and past experience showed most clearly. Most French carpenters used a *doloire*, or French broadaxe (the name deriving from a Latin root word meaning "to flatten") with long skinny shaft and semicircular edge, shaped almost like a teardrop. The larger of these *doloires* were often hafted without any offset, as their heads were long enough to hew across the width of the timber without bringing the handle down next to the knuckle-eating wood. Edges were usually single-bevel, though some were double-beveled. The Brits (and some French too) seemed to favor goosewing-style broadaxes with long, nearly straight single-bevel edges and a healthy offset on the haft to keep knuckles clear of the timber. A cross-section of all nationalities, especially the less-experienced hewers, chose the smaller, light-weight and versatile Scandinavian axes, whether single, or double-bevel, offset or straight-hafted. Generally, the larger heavier axes were employed to make cross-grain finishing cuts perpendicular to the length of the timber while moving forward along the log, while the smaller axes might be used to make more angled cuts as much as 45 degrees to the grain, and could be used to hew backwards or forwards depending on the preference of the hewer and the condition of the timber (it's always easier to hew toward a knot . . .).

When the first face was finished, the process was repeated for each of the three remaining faces. Sometimes adjacent faces were hewn in sequence, though more often (especially on longer timbers) two opposite faces would be hewn first, to help mitigate the risk of the timber curling toward the (rapidly drying) adjacent hewn faces.

Once the timber was completely hewn, the freshly squared beam was ready to be cut to length. The bulk of the pieces were joined with simple, splayed scarves (in French: "*coupe sifflée*," or "whistle cut") to create three 10x14x70 stringers, each composed of five separate pieces. The two timbers for the top railing, hewn to 6 in. x 8 in. x 38 ft., were hoisted onto trestles and pit-sawn (in French: "*scier de long*," or "sawing the length"), then lowered back to their bunks where a pitched top surface was laid out and hewn, and simple, lapped scarf joints with skewed abutments, and mortises for the railing posts were added. The two resulting ~70-ft. long handrail beams were carried like battering rams onto the bridge and dropped onto the waiting tenons of the rail posts.



15 Will Lisak (top) and Tino Piaia pit sawing.

16 Will Gusakov carefully hews the top profile of the handrail.

17 Detail of handrail scarf joint after final installation and hand-planing.



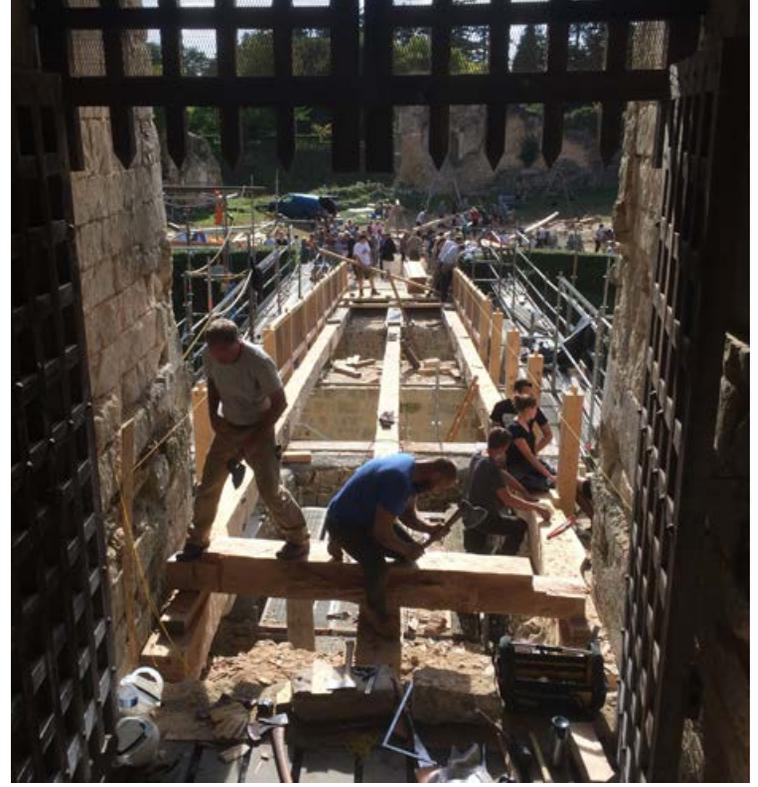
18 Mihai Vatajelu working on the final structural member to be installed—the header at the entrance to the château.

We then began the task of hand-planing them smooth (Figs. 15–17).

After a hot morning of sawing, hewing and sweating, we were all ready for the typically French, four-course lunches prepared by our local caterer. We were served fresh-baked sourdough bread by Kinga Klusak, a baker of Polish extraction now living in France with her partner, Leo Rousseau, one of our carpenters. Kinga, who has become a fixture on CSF jobsites, spent every morning baking for the crew in the wood-fired earthen oven which sat at one corner of the courtyard. In the afternoons she would weave her way through the field with a tray of warm pastries and coffee.

Our work would continue until 6 or 7 PM, at which point we would stroll over to the local teahouse for a cool Belgian beer, or drive over to a swimming hole in a frigid brook to cool down. We would return to the château grounds for another fine four-course meal, followed by an evening program—a visit to a nearby building of historical interest, a lecture on past projects, or a screening of a short film following a pair of apprentice carpenters in the French Compagnon guild system as they go about creating their masterpieces, required for graduation to journeyman status (see TF 97). One evening we were treated to a lecture by an architectural archaeologist specializing in medieval timber structures. He has studied the link between frame and forest, analyzing several historic timber frames and the medieval silviculture practices that supplied the timber. We learned that structural oak was coppiced in 75-year cycles! We also visited nearby Aclou to examine CSF’s 2016 project—the complete sill-to-ridge restoration of a gable wall of a 1491 barn (documented in TF 122).

Our crew was made up of a core of about 30 experienced carpenters, two-thirds of whom were French, while the rest hailed from a smattering of other nations (Estonia, the Netherlands,



19 View of the work through the château gate.

Romania, Hungary, the UK and more). A few architects and hobbyists were among our group, as well as a boat builder. Our ranks were nearly doubled when groups of students from local carpentry programs would help out for a day or two, and on the weekends when more locals had time to participate. We were housed in a lovely local *gîte* (essentially a bed-and-breakfast) a few miles from the jobsite, where thankfully we were the only occupants (our noise and odor would not have jibed well with any other visitors’ ideas of a peaceful getaway . . .). We bunked four or five to a room, many of us snoring and otherwise dealing with the consequences of consuming two cheese plates per day along with quantities of local calvados—moonshine apple brandy.

CSF strives to live up to the social-justice implication of the Sans Frontières (“without borders”) part of its name. In 2015 the migrant crisis peaked in several western European countries as large numbers of migrants, mainly from Africa and the Middle East, fled their home countries in desperate attempts to enter the EU. In France, the crisis manifested most notoriously in the so-called “jungle” refugee camp in Calais. CSF volunteers built a timber-framed legal-advice center in the Calais Jungle in 2016. After serving the refugee community for about 15 months, the structure was ultimately destroyed by arson. The ongoing migrant crisis was brought home by the story of one of our crew members—a recent, undocumented immigrant from Guinea.

One of the central principles of CSF is to perpetuate traditional building methods, but the goal of erecting a hand-crafted, wooden bridge that visitors would traverse to enter a publicly owned historical structure meant that historical techniques had to yield to modern engineering principles—as well as bureaucratic indolence. Months



20 The finished bridge, approximately 77 feet long. Note depth of the dry moat that encircles the chateau.

of wrangling between CSF leadership and the local engineers tasked with approving the plans had very nearly derailed the project. The local *bureau des études* (engineering firm) seemed allergic to old-school joinery, requiring most of the joinery to incorporate stainless steel plates and threaded rods. The railing posts had to meet building codes and were also affixed to the oak carrying beams with stainless hardware. After one day of grumbling, we all got on with the project. There was more than enough hand tool work to be done, and one of our crew quipped that the corded drill used to bore holes for the bolted connections may have been powered by a hidden stationary bike at the other end of the cord!

The whole project was carried out in the lower courtyard of the chateau, which remained open to tourists for the duration of the project—indeed, the administration of the chateau and the local government actively promoted the spectacle of the international “medieval carpenters” working away with hand tools. On weekends our jobsite was flooded with enough local spectators to necessitate erecting guardrails around our work areas, and left many of us feeling rather like specimens in a French zoo. The feeling was quickly offset by the many local visitors who expressed their gratitude to us for

traveling and volunteering to help restore a part of their cultural heritage. One little girl wove among the workers handing out candies, while an older monsieur discreetly offered bottles of home-made calvados to any of the foreign carpenters.

There were enough difficulties in communication among such a large and diverse group that several carpenters jokingly compared our task to the Tower of Babel. After each meal our paper tablecloths were covered in explanatory drawings showing a joinery detail or as an aid to translation. Though we took enormous pride in successfully completing the wooden bridge, it was this intangible bridge across culture and language that was the true accomplishment of the project, and all of us left feeling that we had gained a new, somewhat far-flung family.

—WILL GUSAKOV AND HANK SILVER

*Will Gusakov runs Goosewing Timberworks, a custom timber frame shop in Lincoln, Vt.*

*Hank Silver runs Ironwood Timberworks in Montague, Mass.*