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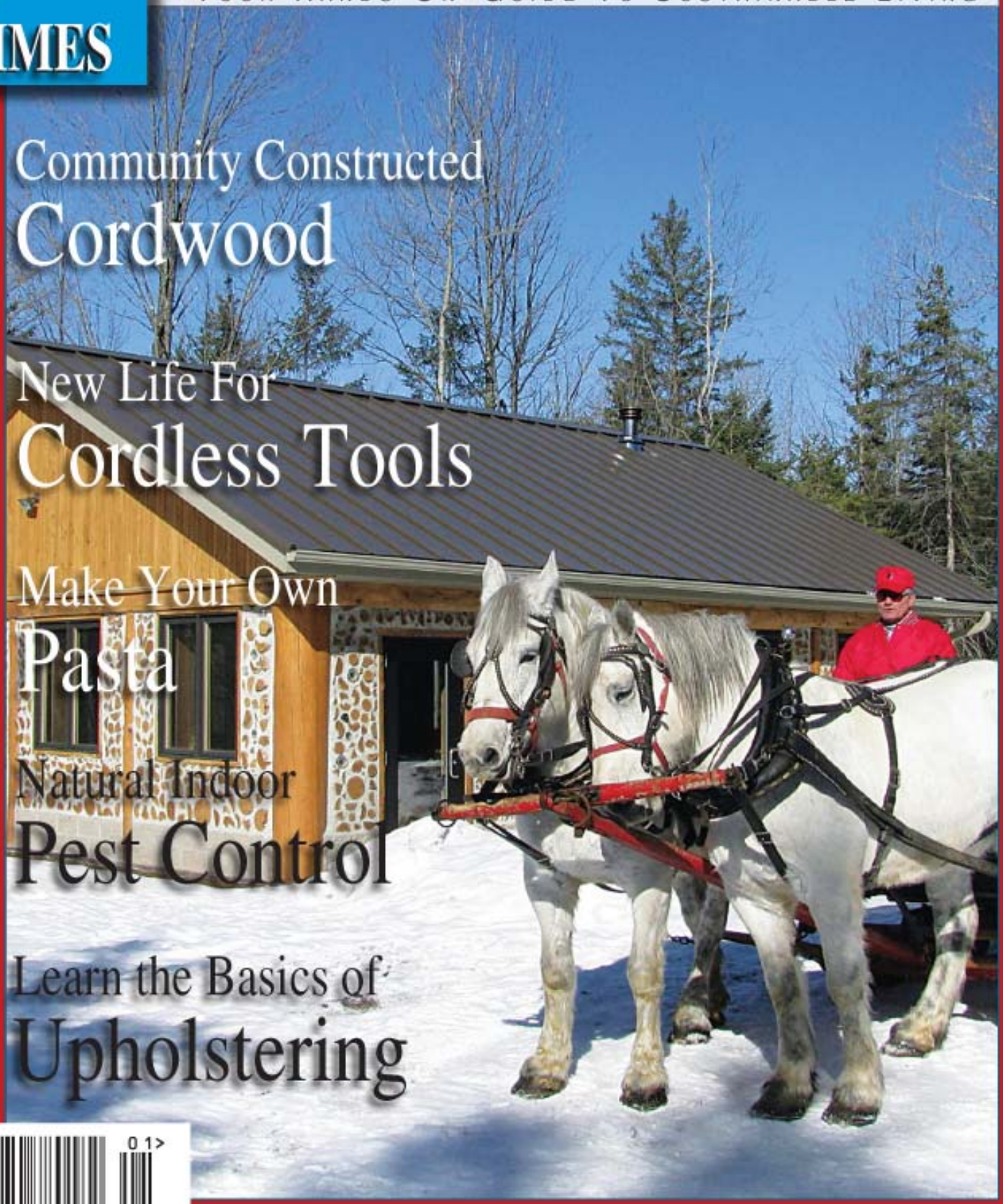

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Cordwood and Community

Alternative building techniques meet Energy Star practices.

By
Richard and Becky Flatau

In the winter of 2007 the Friends of the Merrill School Forest, inspired by the burgeoning green building movement, made a decision to build a teaching center on the 764-acre School Forest property that would model best practice principles of alternative construction and showcase renewable energy for the community of Merrill, in north central Wisconsin. The building would serve as a classroom, nature center, and warming shelter where students could gather after hiking the Forest's trails. This group asked us to be the consultants, cordwood masonry instructors, and coordinators of the project.

The building committee explored various alternative construction options and decided to build a cordwood structure in which the building materials would be sustainably harvested from the surrounding forest. The Cordwood Education Center was then architecturally rendered and state code approved for the students of the Merrill School District.

Preparation began in earnest when 25 cords of tamarack were cut during that winter. In the early spring, community volunteers peeled mightily with draw shaves and peeling spuds. Later that spring a portable sawmill was brought in to cut the timbers, posts, and paneling. Then a buzz saw rig on a John Deere tractor was put

to use cutting the cordwood infill to 16-inch lengths needed to lay up the walls. The volunteers created some interesting shapes using log splitters and hatchets, and after a short while, rows and rows of split tamarack were covered and left to air-dry to a moisture content low enough to prevent shrinkage in place and subsequent log loosening.

The footprint of the building began with a Frank Lloyd Wright–style rubble-trench foundation (the same kind the architect used on his numerous Wisconsin houses) and a turned-edge, insulated slab. Cross-linked polyethylene (PEX) tubing was laid into the concrete slab for solar in-floor radiant heating. The framework of massive white pine corner posts and tamarack middle posts was erected in the spring of 2008, giving the high school construction class a perfect opportunity to learn the art of timber framing and alternative construction.

The general contractor gave lessons in safety, basic construction techniques, and the proper methods of squaring and leveling. An "energy heel" truss roof (in which the trusses

During the infill process, precise sizes and shapes were created using log splitters and hatchets. Volunteers were instructed to make the shapes "funky."

are built with an elevated vertical heel between the top and bottom chords to allow for ample insulation all the way to the wall perimeter) was erected and topped with warm brown standing-seam metal roofing. Once insulated, the roof would have an R-53 insulation value, perfect for our northern winters.

Volunteers laid the cordwood infill on two three-inch-wide mortar beds separated by an insulating layer of dry sawdust mixed with hydrated lime.

Plans had been developed to use photovoltaic panels to provide solar electricity, and solar thermal panels for in-floor radiant heat. The design would also take advantage of the great thermal mass of the Cordwood Center structure itself. The building was oriented south for optimal passive solar gain. Once the solar window was established, the surrounding trees were harvested and used for firewood. In order to take advantage of the solar input, Energy Star construction guidelines were used in every phase of the building.

Because this was such a popular community project, generous donations were willingly offered, including a noncatalytic firebrick-lined Vermont Castings Encore woodstove, donated by the Merrill Rotary Club, to provide auxiliary heat to the building. Eleven low-E argon-filled casement windows, two insulated steel doors, and a supply of attractive split-faced foundation block came from benevolent local businesses.

In the fall of 2008 the cordwood wall infill work began. Volunteers arrived daily to learn the old-fashioned art of cordwood masonry construction. Cordwood actually has historical roots in this area. The first mention of its use in construction came in a newspaper article in 1859. The oldest existing cordwood structure here, built in 1884, is the Kruza home and chicken coop, which has been moved from Shawano to the outdoor museum at Old World Wisconsin in Waukesha County. There are also numerous examples of turn-of-the-century cordwood in Door County, the state's eastern peninsula on Lake Michigan.

Dried firewood-length logs—in this case 16 inches—were laid in a mortar matrix of two three-inch-wide mortar beds at the outer edges of the wall foundation. The center cavity was then insulated with dry sawdust mixed with hydrated lime. Built this way,

the walls have an insulation value of R-24, as confirmed by the University of Manitoba Engineering Department in 2005.

Recycled colored bottles (known as "poor man's stained glass") were mortared into the walls among the log ends. These provide bright, light spots when the sun strikes the bottle ends. Stones, gems, and animal tracks were also set into the mortar. Not only do they look interesting but they allow the students ample opportunities from which to launch into a spontaneous game of "I Spy." Some log pieces were deliberately left long to provide interior shelves for the structure.

Recycled bottles were incorporated into the wall at various places to create a stained glass appearance.

The cordwood infill took five full weeks to complete. As the walls slowly took shape, the inherent beauty of the building became apparent. The Big Dipper bottle-end wall was an example of using the "stained glass" colored-bottle motif to create a teaching center. The Big Dipper wall is made to scale and points to the North Star, so students unintentionally learn some basic astronomy when visiting. The building was finished over the course of the winter of 2008–2009 as the gable ends, the interior ceiling, and the lighting were installed

The Cordwood Education Center was made to be a model of renewable energy and sustainable building practices. In keeping with that theme, a pedal-driven "Energy Cycle" was designed to teach students how much "muscle-wattage" it takes to produce electricity. While riding the bike with the DC motor attached to the back wheel, boys and girls can feel for themselves how much easier it is to illuminate the compact fluorescent bulb (CFL) as opposed to the incandescent light.

In the late winter of 2009, we celebrated the completion of the Center with an open house and family fun day, complete with skiing, snowshoeing, and horse-drawn sleigh rides to and from the facility. The appeal of the building, the beauty of the warm masonry walls, and the upbeat feel of the whole event made for a welcome and peaceful sojourn. This is a place where many people will visit to embrace nature and set aside the demands of the day, if even for only a few hours.

A Vermont Castings woodstove was donated by the local Rotary Club to provide backup to the warm-floor heating system.

Richard and Becky Flatau are the authors of Cordwood Cabin: Best Practices, *which details the building of the Cordwood Education Center. It is available for $15 plus $2 shipping and handling ($4 to Canada) from www.daycreek.com/flatau, or from Cordwood Construction Resources, LLC, W4837 Schulz Spur Drive, Merrill, WI 54452.*