Building A Concrete Dome House

Former mechanic constructs his own retirement home using a kit and site-mixed concrete

USually when people retire, they travel, pursue favorite hobbies, or just relax. But that’s not the case for retired mechanic Norval Jones.

When he turned 70 a few years ago, Jones decided to build his own retirement home—a 30-foot-wide, 15-foot-tall concrete geodesic dome. How did one man with little building experience tackle such an ambitious project? With the help of a kit containing all the components, plans, and instructions necessary for concrete dome construction.

The main component of the dome home is a triangular panel with a core of 7-inch-thick polystyrene foam insulation, precisely angle-cut to fit flush with adjacent panels (see drawing on next page). The exterior side of each panel is covered with galvanized steel mesh that extends slightly beyond the edges of the foam. Fiber-reinforced concrete encases the steel mesh, covering all but the outside edges of the foam and mesh. These edges are beveled to allow for application of concrete in the seams between panels.

You don’t have to be an experienced homebuilder to construct this concrete geodesic dome. Simply erect insulated, steel-mesh-reinforced concrete building panels following a blueprint, connect the steel mesh between panels, and concrete the seams to produce a weathertight, insulated shell.

Figure 1. The triangular panels are installed, one row at a time, on top of a base row of rectangular panels. The rectangular panels allow for easier placement of furniture against the interior side of the walls.
or homebuilder to construct the geodesic dome, Jones simply followed a blueprint to erect the panels, and then connected the steel mesh between panels and concreted the seams to create a weathertight, insulated shell.

In addition to being easy to erect, the dome home is energy-efficient (the R-28 polystyrene insulation is uninterrupted), fire- and termite-resistant, low-maintenance, and economical. Jones purchased the dome kit, which yields a living area of 1,060 square feet, for less than $9,000. (Plumbing, electrical wiring, and interior and exterior finishing materials are not included.) The supplier also has kits for dome dog houses, utility sheds, and other home sizes up to 5,214 square feet.

Construction Steps

Shell. The triangular panels are assembled, one row at a time, on top of a base row of 4-foot-tall rectangular panels. The rectangular panels, with their square corners, allow for easier placement of furniture against the interior side of the walls (Figure 1). The rectangular panels are secured to a slab-on-grade foundation with #4 rebar, which are embedded in the foundation and extend vertically into the panel seams.

After hoisting the triangular panels for each row into position by crane (Figure 2), Jones overlapped the steel mesh to reinforce the seams. Next, he applied a foam bonding agent in the seams to temporarily hold the sections in place until the seams were concreted.

Using a portable mixer, Jones prepared a concrete mix containing portland cement and sand as well as fibers and other special additives supplied with the kit. He trowel-applied this mixture into the seams, carefully blending it with the panel concrete to produce a smooth, joint-free exterior.

Jones used 2x4s to temporarily brace the triangular panels during assembly (Figure 3). After the panels are erected, they are self-supporting. "The dome house follows the same concept as a stack of rifles all leaning against each other in a circle, each rifle supporting the other," says Jones. "The individual panels are supported by [adjacent] panels, so there is no need for supporting beams." Because the dome does not require supporting beams or load-bearing interior walls for support, the homeowner has greater flexibility in interior design.

The door and window frames for the home are built of 2x4s. Jones also built a sheltered entryway (included with the kit) using 3½-inch-thick polystyrene foam wrapped with steel mesh. Jones set the panels in place, connected them to the adjacent dome panels, and then stuccoed them with the same concrete.
mixture used to fill the panel seams. The home has three triangular windows and, to let in additional light and ventilation, Jones installed three rectangular skylights in the peak of the dome. The skylights, available as options with the kit, can be opened on hot days to allow heat to escape. Jones also devised corrugated PVC awnings for the triangular windows to keep out the sun’s intense summer rays.

**Exterior finishing.** After all the panels were in place and the seams were concreted, Jones used an angle-head grinder to remove rough spots. He then painted the dome exterior with three coats of a white, elastomeric paint. The paint seals and waterproofs the concrete and is flexible, so it will not crack when the concrete expands and contracts.

**Interior finishing.** Jones framed the interior partition walls using 2x4s and drywall. Except for the bathroom walls, which extend to the ceiling, all the interior walls are 8 feet tall to improve air circulation throughout the house. The perimeter walls are covered with ½-inch-thick drywall, applied with a strong construction glue directly to the polystyrene foam (Figure 4).

Jones started construction of his Glendale Heights, Ill., home in the spring of 1993, with a goal to complete it by September 1994. But due to local road construction, the project wasn’t completed until the spring of 1995, when Jones turned 72.

Jones now lives comfortably in his concrete dome home, satisfied that he has left his mark in the world by building a structure that will endure for many decades.

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![Figure 4. To finish the inside of the dome’s perimeter walls, Jones glued drywall directly to the polystyrene foam. He installed the spiral, wrought-iron stairway to allow access to a 395-square-foot loft.](image-url)