

The Monolithic Dome Industry

by Sean Lanham

If you have never seen a Monolithic Dome, the experience is hard to imagine, let alone describe. But if you have, it's something you likely won't soon forget. These unique structures are strong, tough and built to last for a long time. Moreover, this rapidly developing sector of the construction industry holds the promise of opening up all sorts of new vistas for shotcrete placement applicators. An increasing number of people are choosing Monolithic Dome architecture for their homes, but the real building boom is occurring in the construction of schools, churches and storage facilities.

As the name implies, Monolithic Domes are one-piece, steel-reinforced concrete structures that duplicate one of nature's architectural marvels — the egg. They are economical to build, highly energy efficient, virtually fireproof and better capable of withstanding the worst natural disasters, including tornadoes, hurricanes and earthquakes, than many conventional buildings and structures.

Monolithic Domes have been around since the 1970s, but there has been a major upsurge in interest recently. This is partly due to the Internet, which has helped spread the word about these unique structures. The Monolithic Dome Institute's web site at www.monolithic.com averages one million hits per month. Monolithic Domes have been described as the building of tomorrow, available today. But while they may look high-tech, the building process is actually quite simple and straightforward.

It begins with the pouring of a circular reinforced concrete foundation. The next step involves the inflation of what is called an airform, which is firmly anchored around the perimeter of the circular foundation. When inflated, the airform creates the shape of the dome.

The airform is then sprayed from the inside with a coating of polyurethane foam insulation in several stages, totaling about 3 inches (75 mm) in thickness. A grid of reinforcing steel is attached to the interior surface of the polyurethane. Finally, the rebar grid is embedded in a 2 to 4 inch (50 to 100 mm) thick layer of shotcrete, creating a strong, energy-efficient and permanent structure. Since most of the construction process takes place on the interior, crews are rarely hampered by weather delays once the airform has been inflated. When necessary, they can even work around the clock.

There are several key differences in shooting shotcrete for a Monolithic Dome and more conventional applications. Directing the shotcrete overhead obviously requires different skills. An array of masks, filters and other protective gear are available to safeguard workers. The shotcrete is applied in layers 1/2- to 3/4-inch (12.7 to 19.0 mm) at a time. For smaller domes, shotcrete is mixed and sprayed at about 3 cubic yards (2.3 m³) per hour. For the very large projects, 200+ cubic yards (153 m³) per day are "shot."

Many of the Monolithic Dome school buildings are being

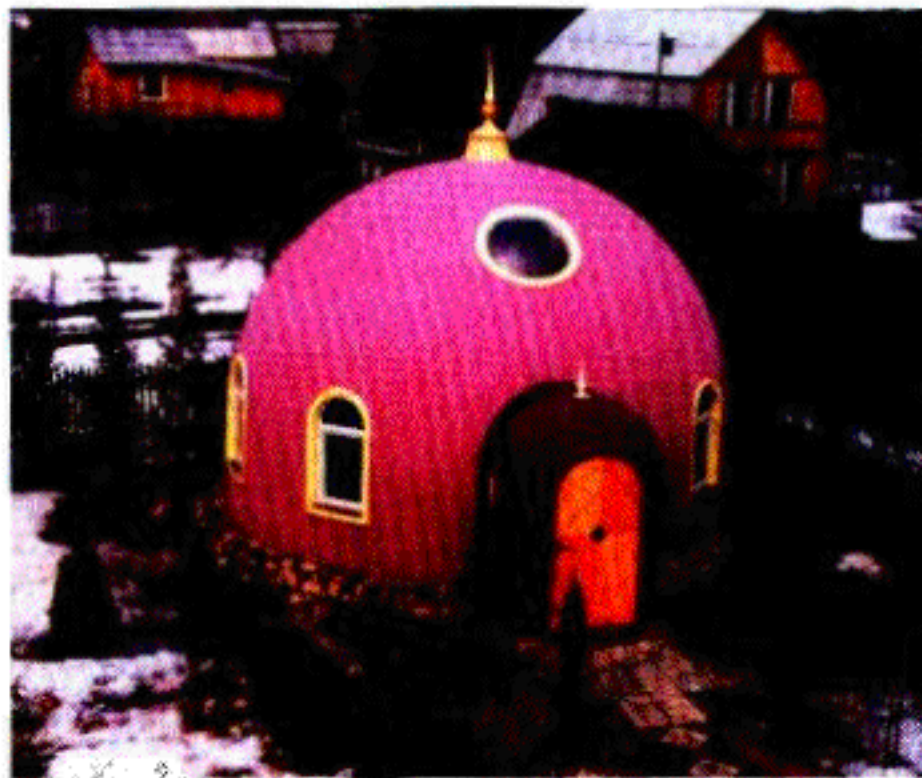


Figure 1: Monolithic Domes are gaining in popularity all over the world. This dome home in Moscow was built by a native Russian who attended a workshop at the Monolithic Dome Institute. The 36 by 18 foot dome home is the first of its kind in Russia.

constructed on stemwalls, which range in height from 8 to 20 feet (2.4 to 6.1 m). These stemwalls are generally built by spraying shotcrete against a single-side form. Generally, a five-man crew is used to build a Monolithic Dome, but some projects are built by just two or three people.

For those who are just getting started, a good first step is to attend a five-day workshop at the Monolithic Dome Institute in Italy, Texas. Held four times a year, the workshops include

Figure 2. One of the best uses for Monolithic Domes is storage facilities. This domed storage facility in Durkee, Oregon measures 145 feet by 92 feet and has a 45,000 ton capacity. Dome Technology Inc. of Idaho Falls, Idaho, was able to build the facility for Ash Grove Cement for approximately 25 percent less than what a silo with similar storage capability would have cost.



Shotcrete Corner

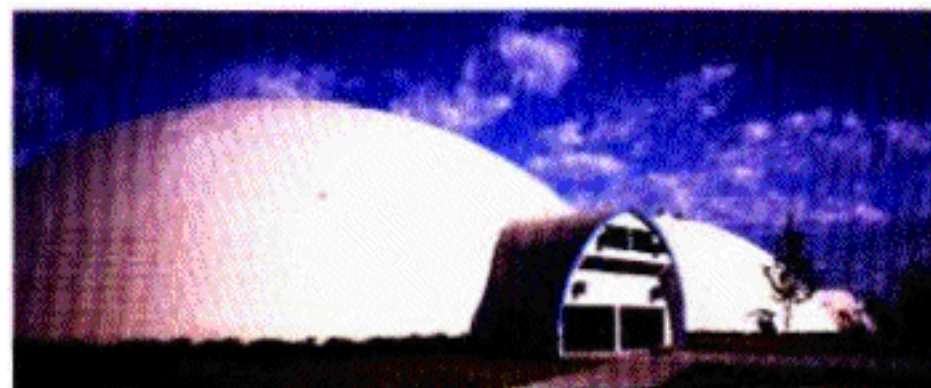


Figure 3. Emmett High School in Emmett, Idaho, pictured here, had the distinction of being the first Monolithic Dome school in the nation when it opened in 1988. Since then, school districts in Texas, Oklahoma, Arkansas, Florida, Minnesota, New Mexico, Missouri, Oregon and Arizona have broken with tradition and decided to build domed facilities.

both hands-on training and classroom instruction. Participants actually build a Monolithic Dome by applying the principles learned in class.

If you wish to try your own hand at building a Monolithic Dome, you can start by ordering a MonoKit. It includes pre-designed blueprints for a home that is energy efficient, comfortable and affordable. It also contains an airform, rebar hangers and clamp straps.

Most people who have seen a Monolithic Dome home will tell you that they are definitely an acquired taste. Just the same, the growth in popularity in domes is undeniable, and almost



Figure 4. Bruco — the Italian name for caterpillar — houses the Airform manufacturing plant of Monolithic Constructors, Inc. in Italy, Texas. It was built using a single Airform that was shaped as seven interconnected domes. When the Airform was inflated, this shape was automatically achieved.

everyone agrees that the advantages far outweigh the brief period required for acclimatization.

About 800 Monolithic Domes homes have been built since they were first introduced, but the vast majority of these were completed during the 1990s. David B. South, president of the Monolithic Dome Institute and co-inventor of the technology that makes construction of these domes possible, likes to joke that they are an “instant success after 25 years.”

Look for the upswing to continue, and check out www.monolithic.com to learn more about Monolithic Dome architecture.