

The Monolithic Domes, installed at the Equalizer facility in the Port of Victoria in Texas, survived Hurricane Claudette intact, with only minor blemishes on the exterior.



A little before 10:00am on 15 July of this year, Doug Stevens, owner of Equalizer, Inc. in Port of Victoria, Texas, was reassessing the decision he'd made four years earlier about what type of storage facility he would build. He had a strong sense that he'd made the right call, writes Sean Lanham of *Monolithic Domes*.

Equalizer provides distribution services for liquid and dry bulk fertilizer manufacturers. Secure storage of the fertilizer products is vital to the company's operations. And on that July morning, Hurricane Claudette made landfall with winds clocked in excess of 90 miles per hour, scoring a near direct hit on Equalizer's storage facilities.

Because Stevens had opted for Monolithic Dome storage facilities, there turned out to be little cause for concern. "The domes came through the storm well," he says. "There were only some minor blemishes on the exterior. Some of our other buildings were pretty badly damaged."

Monolithic Domes are steel-reinforced, concrete buildings that are known for their ability to sustain hurricane-force winds, tornadoes and even earthquakes. Of the hundreds that have been built around the world, only a few have been put to the

test. But the domes have come through unscathed every time.

"A Monolithic Dome is one of the strongest structures that can be built," says David B. South, who co-invented and patented the process for building the domes and now heads the Monolithic Dome Institute in Italy, Texas. "Because of their shape and the materials used in their construction, they are virtually indestructible."

That makes Monolithic Domes a good choice for storage facilities that, like the Equalizer domes, are situated along the coast. The two domes, which measure 130 feet in diameter and stand 70 feet tall, are located



Sadly, not all the storage buildings at the Equalizer facility came through Hurricane Claudette intact.

alongside the Channel to Victoria, a 34-mile long, 100-foot wide winding canal linking to the Gulf Inter-coastal Waterway and ports around the world.

Stevens is as pleased with the performance of the domes as he is with their durability. "We considered other building types an A-frame structure made of wood and concrete," says Stevens, "but it would be harder to control humidity inside it."

For Equalizer's business, humidity can be almost as damaging as a hurricane. The company's main storage products are ammonium nitrate, urea fertilizer and diammonium phosphate 18460. Stevens says controlling the humidity in an ammonium nitrate storage building is of critical importance.

"Ammonium nitrate is a hygroscopic product, which means it draws moisture out of the air," Stevens says. "Moisture breaks down the granules, so we installed a dehumidifier inside the domes. No matter what the temperature is outside, the humidity or moisture inside the domes is maintained at a constant 30% and because they are pretty much airtight, the dome concept is more affordable."

Stevens was also able to keep costs down by acting as his own general contractor in the construction of Equalizer's two domes. "It all went as planned, very smooth," Stevens says. "We had no major disasters or setbacks."

Dome Technology Inc. of Idaho Falls, Idaho was responsible for building the dome shells. Construction began with the pouring of a circular foundation. Two inflatable canvases, known as airforms, were then attached to the steel rebar surrounding the foundations and inflated using giant fans. This created the shape of the domes.

Once the airforms were inflated, work moved to the interior where three inches of polyurethane foam was sprayed on each structure. A grid of steel rebar was then placed into the foam and later embedded in shotcrete that ranged in thickness from 4 inches at the top to 8 inches at the base. This process created safe, permanent and energy-efficient structures.

"The second airform tore during the construction process, but we were able to repair it in the field so that it was both structurally sound and aesthetically pleasing," said Boyd Willson, senior project manager at Dome Technology. "Overall, the construction process went very smoothly."

Willson noted that the crew took steps to give the storage units added durability. "We incorporated the use of silica fume in the concrete products to tighten the structural finish and make the concrete more acid resistant to enhance the durability," he said, adding that special

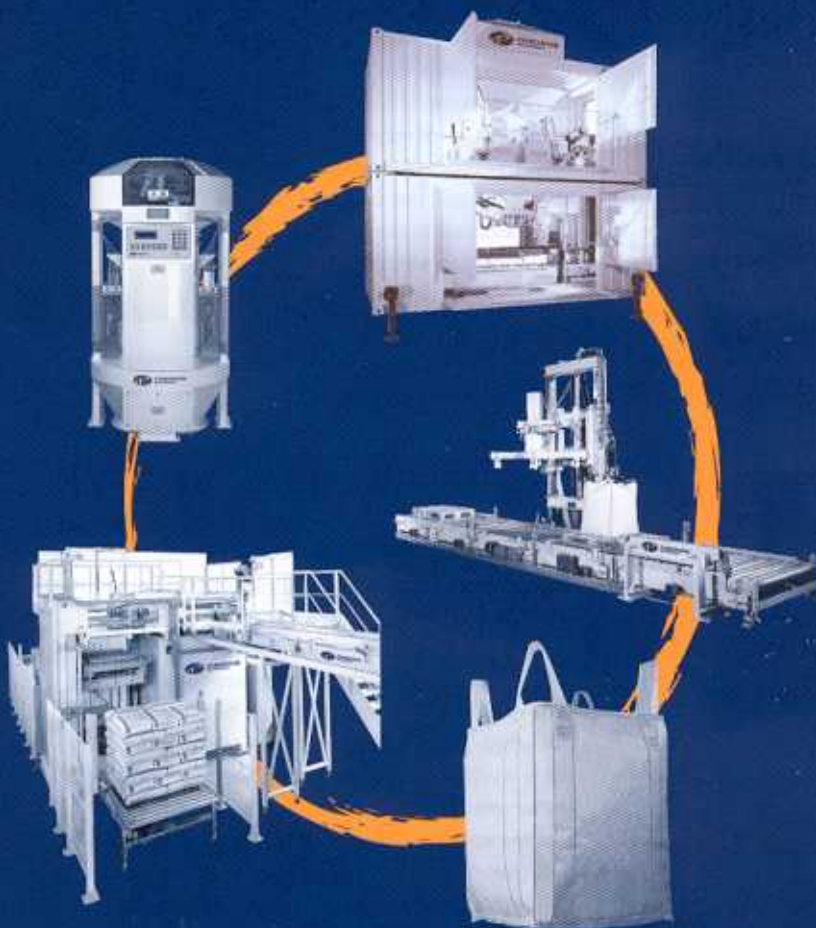
measures were also taken to strengthen the entrance of each dome in case they were hit by giant loaders.

Equalizer's fertilizer products are now barged to the domes from the lower Mississippi and down the Victoria Barge Canal. A conveyor loads the domes through a top-down 'soft drop' system that consists of stainless steel chutes that distribute the piles to the back of the dome. The product is then retrieved and transported to Equalizer's customers on a first-in, first-out basis.

Today Stevens can look back on that bleak day in mid-July when Hurricane Claudette rudely introduced herself to the Port of Victoria and remain philosophical. "We are in a hurricane zone," Stevens says. "We have to be on the water but we have to keep our product dry and intact."

Stevens also indicated these first two Monolithic Domes built for Equalizer may not be the last. "We're pleased with the domes," Stevens said. "It's a very impressive-looking facility. And they are tough."

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