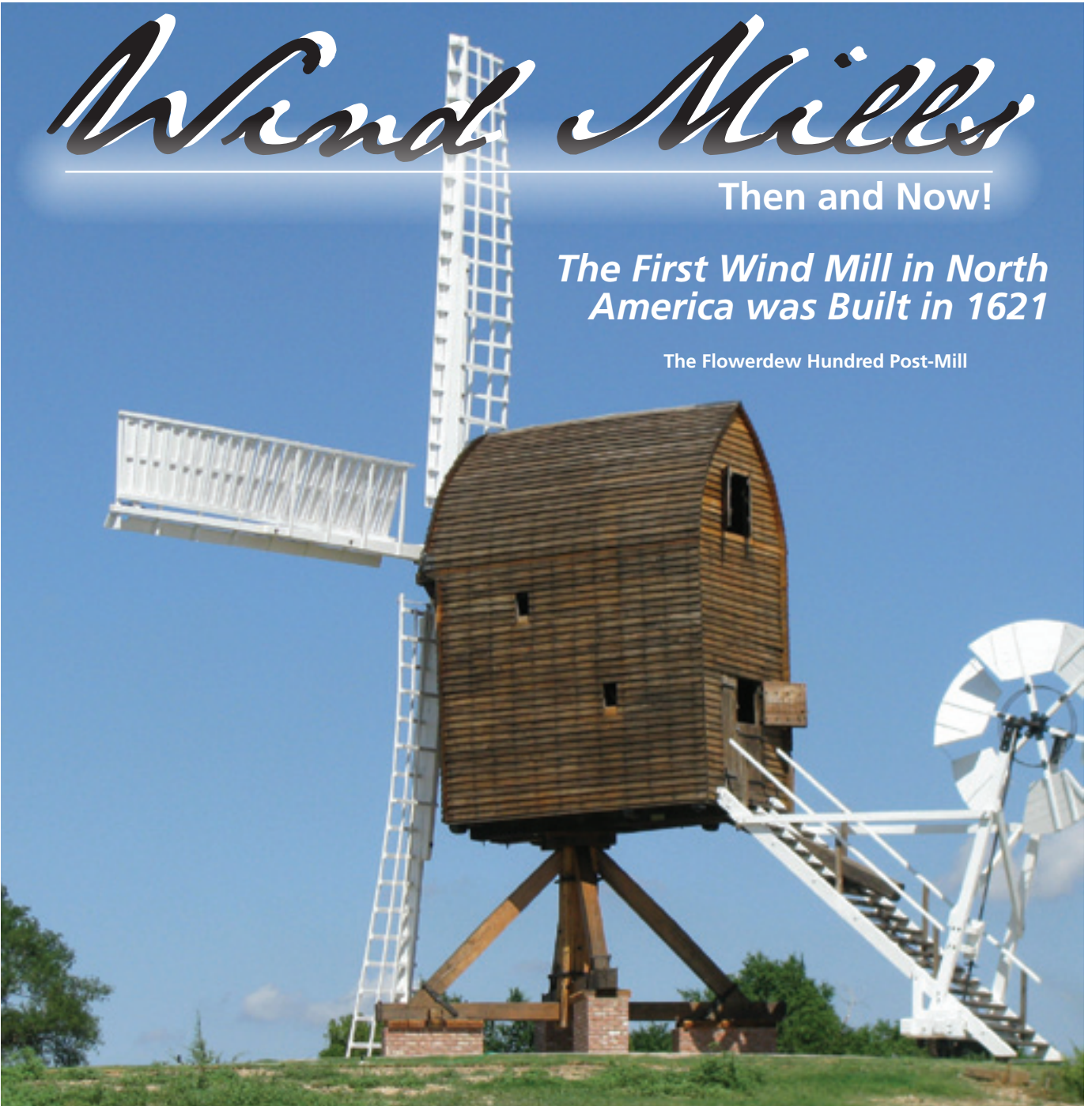


Wind Mills

Then and Now!

The First Wind Mill in North America was Built in 1621

The Flowerdew Hundred Post-Mill



The first windmill built in North America was constructed in 1621 for Sir George Yeardley on his plantation, Flowerdew Hundred, in Virginia. The original windmill was destroyed in a storm, but remains were found in later excavations.

In 1978 a new, commemorative windmill was built at Flowerdew Hundred incorporating features that illustrate the development of English windmill technology through the 18th century. In the summer of 2010 this commemorative mill was moved from Virginia to its current home on the grounds of the American Wind Power Center in Lubbock, Texas and is one of the very few working Post-Mills in the Western Hemisphere.

The Post-Mill is scheduled to have its own visitor center with closed circuit TV so visitors can watch it grind grain and corn. The history of the windmill has come full circle at a very special museum.

For more information see the website glenn@windmill.com or call 806-747-8734.

Flowerdew Hundred Plantation is located at 1617 Flowerdew Hundred Road, three and a half miles south of Virginia Rte. 10, between Hopewell and Smithfield, however the plantation is no longer open to the public. Flowerdew Hundred Plantation has been documented by the Historic American Buildings Survey.

The following is a list of questions asked about today's Wind Mills. These questions are presented here solely for educational purposes with no pros or cons claimed by the publishers. Answers to these questions were provided, with our appreciation, by John J. Congedo, President, AC Wind LLC and Tanya Meadows, Director of Marketing, American Wind Power Center.

How tall is a wind mill from ground level to the tip of a blade at the highest point?

Depends on output of unit. Vestas V47 is rated 660 kilowatts and is 164 feet from the base to the mid point of rotor (when one of the blades is in the 12:00 position it is approx. 220 feet to the tip), and weighs over 97,000 lbs. GE model 1.5s rated at 1.5 megawatts are usually erected on towers that are 200 to 260 feet in height (when one of the blades is in the 12:00 position it is approx. 300 to 360 feet to the tip).

How long are the individual blades?

Varies with size of unit. Approx. 77 feet long (Vestas) to 112 feet (GE). The bigger the unit, the longer the blades and the taller the tower.

How much do the blades weigh?

Vestas V47 blades and hub assembled is 15,876 lbs. GE 1.5s model individual blades are 12,000 lbs. each. Clipper 2.5 megawatt unit, about 11 tons.

What is the diameter and the circumference at the base of the tower?

Foundation for the Vestas is 26 feet in diameter and 26 feet deep. There are 80 anchor bolts in the concrete that reach the entire 26 feet in the ground and are secured by 160 yards of concrete. Larger units have a larger diameter and deeper foundation.

How much electricity does each wind mill generate?

The Vestas V47's 660 kilowatt asynchronous generator produces 690 volts of AC current at 614 amps. The GE is 1.5 megawatt that can generate enough electrical power to supply the needs of 500-700 homes. Electricity from the wind turbine is 60 cycle AC current. No battery storage is needed as the power flows directly into the utility grid.

What is the minimum wind speed needed to operate, and is there a maximum wind speed?

Most turbines begin production at 10-12 mph wind speeds and will automatically shut off with wind gusts of 45-55 mph.

What is the normal speed of the blades, and does it operate at variable speeds?

Each unit has its own computer system that has a monitor in a control station.

Do the blades' angles change, and do the windmills rotate?

Yes and yes, controlled by their onboard computer system. Blades pitch to control torque/power and to stop the turbine, when necessary. Machine head (top of tower) will yaw to keep the rotor into the wind or otherwise optimize power.

A truck maneuvers a tight turn in the mountains, delivering a huge blade for one of the wind mills.



What are the dimensions of the generator?

Varies by unit and manufacturer. The machine head houses the generator and is 6.7m (L) x 5.3m (W) x 5.2m (H).

How long does it take to erect one?

The concrete foundation has to cure completely before the tower can be bolted into place. Depending on weather and ground conditions, anywhere from a few days to a few weeks after the foundations are in place.

How many wind mills are active in Garrett County?

Approximately 28 turbines, according to news articles.

Is there a particular reason for them being white?

They are light gray. This color has minimum impact against a cloudy sky when viewed from the ground but is very visible against the ground when viewed from an aircraft. Also for temperature, the lighter color is much cooler where the generator is than a dark color would be.

What is the average cost for one windmill complete?

On average you can estimate that if the unit is rated to produce one megawatt then the cost for purchasing and installation would be \$1,000,000. (1.5 megawatt = \$1,500,00.) About \$1.5M - \$2.0M per megawatt of capacity.



All sorts of windmills exist in the area. This one can be seen on I-70 near Hagerstown as it waves to passersby on the Windmill Farm.

