

# Blade Runners

The U.S. became the largest wind energy producer in the world last year.

by Tom Green

A FACTORY NORTH OF ABERDEEN, S.D., IS ON the cutting edge of the renewable energy revolution. When the wind blows, their blades help power the nation and cut greenhouse gases.

Molded Fiber Glass Companies (MFG) has carved an industry niche supplying mass-produced components of polyester resins and fiber glass reinforcements ultimately used for a variety of commercial products. Founded in 1948 in Ashtabula, Ohio, by Robert Morrison, the family still privately owns and handles MFG.

The breakthrough for MFG came in 1953. They were chosen to produce the fiber reinforced plastic (FRP) parts for Chevrolet's new Corvette. MFG soon expanded to precision-engineered FRP boats, high-volume truck and tractor components, bakery trays, concrete forms, satellite dishes, environmentally protected domes, fertilizer hoppers and a variety of other specialty applications.

"MFG now operates strategically focused facilities in 10 states and Mexico and is considered a world leader in reinforced plastics and composites," noted Dave Denny, MFG executive vice president.

Wesley Schamp, acting general manager for the new MFG facility near Aberdeen, explained why the material has been so successful. "Composites are a combination of materials that yield properties superior to the ingredients. Fiberglass composites are used in virtually every major industry worldwide because of their corrosion-resistance, high strength-to-weight ratio, design flexibility

and low tooling costs. All perfect features for wind turbines."

MFG opened their first wind facility in Gainsville, Texas, more than 11 years ago, to mold 80-foot wind turbine blades. As MFG grew, so did the size of the projects it could accommodate. At 318,000 square feet, the MFG facility in Aberdeen is the largest plant in the company.

"From end to end it's a quarter-mile," answered Schamp during a recent tour. "We get plenty of exercise walking between the different bays of operations."

"When we get this facility operating at its full potential, it will definitely be our largest operation in terms of size, team-mates [employees] and revenue," added Denny.

The Aberdeen plant currently makes two sizes of wind blades more than 120 feet long (121 feet and 131 feet), both are precision-designed to fit the hub of a GE 1.5 MW turbine. MFG has a volume commitment contract with GE to deliver blades for the next three years.

At the plant's opening in November 2008, Victor Abate of GE summarized the significance. "By the end of 2008, GE expects to have more than 10,000 1.5 MW wind turbines in operation worldwide. The new MFG facility in Aberdeen will significantly increase the manufacturing capacity of our supply chain."

The credit crunch has slowed wind energy investments, but recent remedies may restart the market.



“Extension of the Production Tax Credit incentive for wind energy investments until 2012 adds a level of security to the process,” Denny declared.

Jesse Jenkins, analyst for the Renewable Northwest Project, agreed. “In the past, these incentives have been implemented one year at a time, and allowed to lapse; throwing these industries into crippling boom-bust cycles. Extending the PTC provides longer-term certainty for businesses to plan investments.”

If wind energy picks up speed, MFG’s Aberdeen plant can rapidly respond to the wave.

“We currently have about 190 team members here operating a full first shift and smaller second and third shifts,” said Schamp. “Every turbine needs three blades. If the orders increase, we could be operating three full shifts with nearly 500 team members by 2010.”

The stimulus bill is expected to revive the renewable energy industry, doubling renewable energy production over the next three years.

Jenkins maintains that, “With this kind of critical support in place, we can expect wind, solar and other renewable energy sources to experience robust growth, bringing much-needed jobs and new supplies of clean, domestic energy.”

And the United States has a lot of wind resources.

The American Wind Energy Association (AWEA) brags that 16 states have greater wind potential than California, where wind energy production started. South Dakota ranks fourth on their list of wind opportunity with most areas rating good to excellent in resource potential.

Not surprisingly, the U.S. became the largest wind energy producer in the world last year. Installed American wind generation capacity has doubled in two years – now more than 20 gigawatts (one gigawatt equals 1,000 megawatts). Minnesota ranks fifth in the nation for installed wind capacity with 1.377 GW; Texas leads all with 6.297 GW.

Germany has more generating capacity, however, the United States has stronger winds. So, our turbines actually produce more electricity. Last year, AWEA says U.S. turbines generated just more than 1 percent of the nation’s electric supply, the equivalent needs of more than 4.5 million homes.

“Winds time has come,” proclaimed Steve Wegman, director of the South Dakota Wind Energy Association, Pierre, S.D.. “We need to go forward and further maximize our potential.”

MFG’s Aberdeen plant currently finishes one blade per day, but has the potential to output five or more every 24 hours running full shifts.

“It’s still a six- to eight-day process for the blade to go from start to finish,” clarified Schamp. “We can introduce additional efficiencies into our operations and add staff, but the steps are still there.”

Wind blades at MFG start as more than 500 pattern-cut



kit pieces made from foam core and balsa wood. These pieces are assembled into long strips, wrapped in a thin fabric of fiberglass reinforcement and vacuum-fusion molded with epoxy resin. After curing in an open tool (mold) for a day, the two sides of each blade are removed, trimmed and smoothed. The two sides are then fused together in the only step at the Aberdeen plant where fiberglass materials are applied by hand.

“Although the end result weighs six tons, the blades are essentially hollow,” explained Schamp. “It’s basically like an I-beam. Our kit pieces of fiber-reinforced foam and balsa form the web or internal support and longer, laminated curved flanges on the top and bottom of each side are sealed to make the air-foil.”

After the hand-applied fiberglass dries, edges are smoothed again and the blade is carried by one of 15 radio-controlled lifting bridges into a robotic painting booth. The thin composite laminate covering the core materials dries translucent; before painting most of the assembled kit pieces are visible down the blade. After painting, the unit undergoes more smoothing, finishing and measuring before the final blade assembly where bolts that will attach to the wind turbine hub are installed.

Each step of the process requires meeting precise measurements.

“We make sure each set of blades is balanced and aligned to work perfectly together before they go out the door,” said Schamp. “The slightest bit of misalignment can reduce performance.”

GE is responsible for the transportation of the finished blades. Part of the plant’s \$41 million price tag included a paved outside storage area to accommodate trucks that haul each set.

The facility was financed through a partnership that included GE, MFG, the Aberdeen Development Corporation (ADC) and local electric cooperatives.

ADC invested \$21 million to construct the building, including a \$1 million loan from the Rural Electric Economic Development loan fund. GE bought all of the molds and some of the specialized equipment required to make the blades and MFG financed the other related expenses to get the operation going.

From prairie land to production in less than a year, after four months of operation, the “blade runners” in Aberdeen are ready to pick up speed.

**Left:** Gov. M. Michael Rounds, seventh from left, and others pose in front of a wind blade measuring more than 120 feet long. **Above:** A blade nears the end of its six- to eight-day manufacturing process. **Cover:** More than 500 pattern-cut kit pieces made of foam core and balsa wood are used to create the 121- and 131-foot long wind blades at an Aberdeen factory. The foam core and balsa wood pieces are wrapped in fiberglass reinforcement and vacuum-fusion molded with epoxy resin. The final blade will weigh six tons. *Photos Courtesy of Molded Fiber Glass Companies*