PPG-Devold AMT Venture

Introduction

February of 2007 may be remembered as the month when Cleveland County got its first taste of the 'new' clean tech economy.

Wind power is responsible for bringing 50 jobs and a $5 million investment at the PPG Industries facility in Shelby, NC. While a 5.5% increase in employment at a single company is hardly an economic boon, this investment is significant arriving on the month following what may have been the dying gasp of a 10-year long cascade of announced layoffs at PPG during which 1,100 jobs (about 55%) were eliminated at the plant[1].

PPG Industries has, for two generations, been an economic fixture in Cleveland County. Major employment reductions by the company were only a portion of a broader trend of rapid decline in textiles, chemicals and other important local industries that, in 2002, resulted in a peak annual unemployment rate of over 10%, at times, the highest in the state[2].

The investment is a 50-50 joint venture by PPG Industries and Devold AMT AS of

Fig. 1 – PPG facility in Shelby, N.C.

Source: Mapquest aerial view

[1] Press announcement of joint venture
[2] 10% unemployment rate

Company Snapshot

PPG-Devold LLC
945 Washburn Switch Rd
Shelby, NC 28150
704-434-2261
http://www.ppg.com
http://www.amt.no

New Wind Power Manufacturing
46,200 ft^2 section of PPG Shelby facility
$5.4 million total joint venture investment
30 jobs in 2007 and 20 more jobs by 2009
February 2007 Ribbon Cutting Ceremony

Total Manufacturing Facility
1.3 mill. ft^2 PPG facility in Shelby, N.C.
$20 mill. facility upgrade in 2006
est. 900 employees in early 2007

Venture Partners Overview
PPG Industries
- Nearly 60 years in Shelby, N.C.
- Produces glass fibers used in composites
- Operates 124 manufacturing facilities in over 20 countries

Devold AMT AS
- Subsidiary of Hexagon Composites
- Specializes in advanced multiaxial textile stitching for composite reinforcement fibers
- Supplied wind industry since 1997

Joint Venture Description
Founded to serve the rapidly growing North American wind market, the PPG-Devold joint venture combines glass fibers produced by PPG with stitching technology from Devold, and produces fiber-glass mats for use for reinforcement material in large composite wind turbine blades.

Norway and will exclusively produce stitched fiber-glass fabrics for use in the production of wind turbine blades.

The partnership, known as PPG-Devold LLC will invest $5.4 mill. into a 46,200 ft^2 section of PPG's Shelby facility. Initially the expansion will employ about 30 people, but by 2009 the joint venture is expected to add another 20 new jobs.

This facility expansion will combine the PPG-produced glass fibers with the advanced multiaxial stitching technology of Devold AMT to make the large volumes of glass-fiber reinforcement fabrics required to meet the demands of the $6-billion North American wind industry growing at 25%-30% per year.

Fig. 2 - Representatives from the Shelby plant, local government, PPG corporate headquarters and Devold AMT gather for a ribbon-cutting ceremony to mark formation of the PPG-Devold joint venture. Feb. 2007

Source: PPG website

Joint Venture Profile

PPG-Devold LLC was incorporated in 2007. The venture will operate in a section of PPG's wholly owned Shelby, N.C. facility. The new venture leverages PPG's infrastructure and U.S. market position and Devold's investment in stitched reinforcement technology.

"This joint venture will help us to ensure our wind energy customers receive ample, high-quality reinforcement fabrics made of PPG fiberglass. By partnering with Devold, we will support one of our key reinforcement fabric channel partners while serving the rapidly growing wind energy market."- Victoria M. Holt, PPG senior vice president of glass and fiberglass

By establishing manufacturing in the U.S., Devold "takes an important step toward becoming a global supplier to the wind energy industry. We strongly believe that our partnership with PPG will strengthen our position to grow both in existing and new markets."- Johan Fausa, Devold AMT managing director[3]

Partner Profiles

PPG Industries

PPG Industries of Pittsburgh, P.A. operates 124 manufacturing facilities in over 20 countries. In 2006, the company earned over $700 million on worldwide sales of more than $11 billion.

PPG has three facilities in North Carolina. The Shelby facility produces glass fibers used in a large variety of reinforced polymer composite products. The 1.3 mill.-ft^2 facility in Shelby was founded nearly 60 years ago and employed about 900 people at the beginning of 2007, down from a peak of 2,000 people in the late 1990s. The facility is also benefiting from a $20 million upgrade announced in 2006[4].

PPG's approach to the marketplace emphasizes the introduction of new

[3] Composites Technology magazine, Dec. 2006
[4] Charlotte Business Journal. Feb. 16, 2007

products, driving innovation, and selective pursuit of value-added product development such as reinforcement fiber-glass mats for wind turbine blades.

Devold AMT AS

Devold AMT AS has specialized in stitched reinforcement fabrics for the composite market since 1992, and became subsidiary of Hexagon Composites ASA (Norway) in 2000.

Originally a textile company with roots dating to the 1850s, Devold began serving the wind turbine market in 1997, and introduced a line of advanced multiaxial technology specifically for wind turbines in 1999. Today, Devold technology is a leader in producing stitched mats of layered unidirectional fibers.

Technology

Supply chain context

Material: E-glass fibers in the form of single-end rovings are produced by PPG at the Shelby facility. This material couples strength and durability with light weight and corrosion resistance in the turbine blade.

Processing: Using Devold's multiaxial textile technology, the individual rovings are combined to form a glass fiber fabric. As a fabric, the reinforcement glass fibers benefit by providing additional strength, higher quality and lower-cost turbine blade.

Component: Individual turbine makers typically assemble their own blades using proprietary designs. Glass fiber is the preferred material due to its lower cost-to-performance ratio than alternative reinforcement materials such as carbon fiber.

End Use: During turbine installation, turbine blades are attached to the rotor and then hoisted by crane to the top of the tower where they are connected to the nacelle.

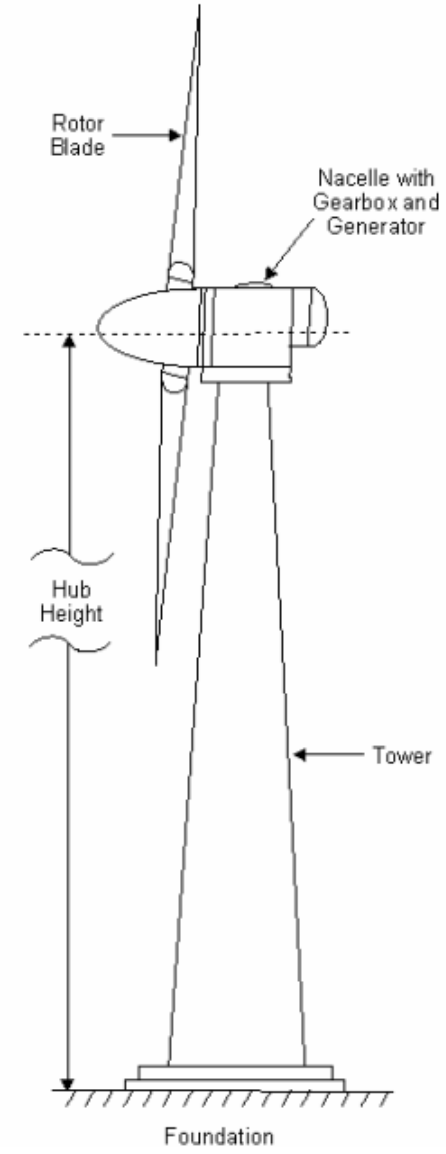

Fig. 3 – Basic wind turbine components

Source: Sterzinger, G. et.al. "Wind Turbine Development: Location of Manufacturing Activity." Renewable Energy Policy Project, Sept. 2004

Wind turbines have several basic components, as shown in Figure 3. The *tower* is often a large steel cylinder that may stand over 300-feet tall. On top of the tower is the *nacelle*, a large metal box

which houses speed changers and switchgears, brakes, and often power generation equipment. Extending out from the front of the nacelle is the *rotor* which holds the *blades*.

The blades are shaped to spin when the wind blows, and their design is a major factor in how much power the turbine can produce. Using glass fibers enables the blades to achieve a high strength-to-weight ratio, resulting in some of the lowest cost power

Turbine blades are typically constructed at specialized facilities located in relation to windy areas by each wind turbine manufacturer. These facilities are the destination of PPG-Devold's glass-fiber fabric product.

Each polymer composite blade may be as long as a football field and thicker than a human is tall. Turbine blades are increasingly constructed via an automated process. A shown in Figure 4, over half of the blade cost is typically fiberglass.

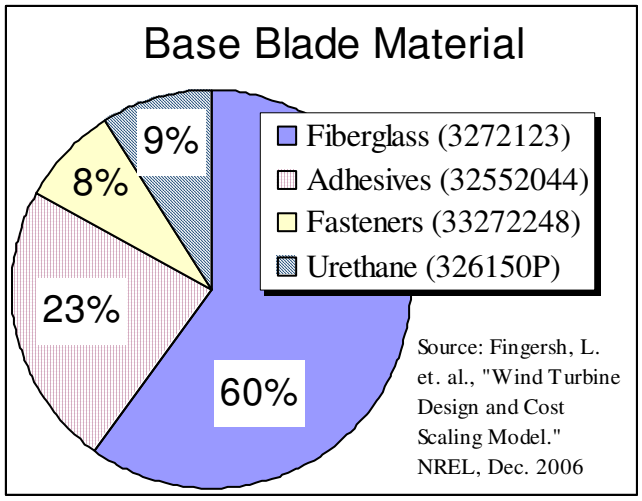

Fig.4 – Wind turbine blade components with NAICS codes and share of total blade costs

Market size

By the end of 2007, the American Wind Energy Association projects a cumulative installed electricity generation capacity of over 15 GW – more than triple the combined generation capacity of North Carolina's three nuclear electricity facilities.

In fact, the U.S. wind power industry has been enjoying record growth for two years running and is on pace to continue this trend in 2007 with almost 4,000 MW of new installed capacity projected. At the end of 2006 (Fig. 5), the U.S. had about 15% of global installed wind capacity.

The top three manufacturers serving the

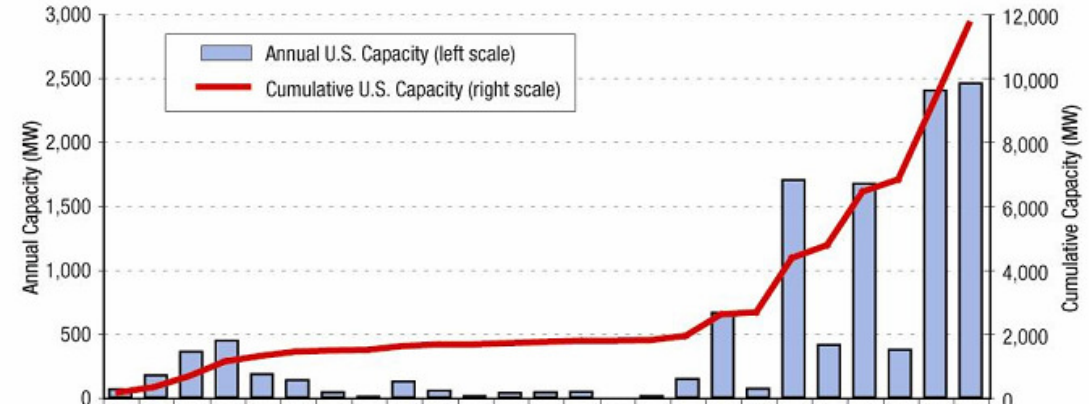

Fig. 5 – Cumulative and Annual Installed Capacity, U.S. Wind Industry

Source: Wiser, R. et.al. "Annual Report on U.S. Wind Power Installation, Cost, and Performance Trends: 2006." U.S. Department of Energy, May 2007

U.S. market have almost 90% of the market share. The largest of these is GE with 47% of the 2006 market. In 2006, Siemens entered the U.S. market carving a 23% share, which included a full third of Vestas' market share. In total, wind manufacturers in the U.S. made over 1,500 turbines requiring almost 4,600 blades, which if laid end-to-end alongside I-85 would stretch from Charlotte to Research Triangle Park[5].

Supporting Development

Despite there being virtually no in-state wind industry, Cleveland County's new jobs did not occur by chance.

These new jobs are the result of several driving forces, including: a global capacity shortage in wind turbine manufacturing, the high rate of idle textile industry experience spanning generations in the county, and the long-term relationship between a leading global manufacturer and the Town of Shelby.

The demand for wind turbines has so far outpaced suppliers' manufacturing capacity that orders made today will not be delivered for about two years[6]. In October 2007, GE announced their wind turbine order backlog of 2 years would continue through 2009[7] after receiving a 200-turbine order (300MW capacity) from SkyPower Corp. valued at $400 million[8].

Fig. 6 – A 200-foot blade for a 5MW offshore turbine being transported to Scotland

Source: LM Glasfiber

Cleveland County's economy has suffered as the textile industry moved offshore faster than lost jobs could be replaced. In 1990, the textile industry employed over 11% of Cleveland County's labor force, but at the end of 2006, textile industry employment has declined by over 80%. Over the same period, the county has added a total of 900 jobs while the number of unemployed people in the county has increased 50% to over 3,000[9].

These job losses only reinforced the importance to the county of keeping what industry remained. This dedication to stemming their economic decline was exemplified by the 2006 restructuring of utility service to PPG. Facing a considered plant closure and the loss of the remaining 900 PPG jobs, a deal was arranged in which PPG reduced their operating costs by about $500 million in a deal with the Town of Shelby at virtually no cost to the town.

The gain of these wind manufacturing jobs was made possible because of the inherent economic assets and historical industry experience of Cleveland County. Renewable energy growth provided an opportunity to leverage traditional industry knowledge and existing manufacturing infrastructure into job gains from the new 'clean tech' economy in this N.C. County.

[5] Wiser, R. et.al. "Annual Report on U.S. Wind Power Installation, Cost, Performance Trends: 2006." National Renewable Energy Laboratory, May 2007.

[6] "Wind Turbine Shortage Continues: costs rising." Sun Jourmal, Lewiston, ME. Aug. 24, 20007.

[7] Hinton, C. "General Electric infrastructure gets the limelight." MarketWatch, Oct. 11, 2007

[8] Mozee, C. "GE unit in $400 Mln agreement to supply wind turbines." MarketWatch, Oct. 1, 2007

[9] N.C. Employment Security Commission, Labor Market Information data