

Clipper teams up to forge new beginning

A major partnership deal between industry giant UTC and Clipper Windpower is set to bring the innovative turbine manufacturer to the fore with the help of substantial investment and years of experience, writes [Mark Anderson](#)



PHOTOS: CLIPPER WINDPOWER

Strategic investment
Clipper wants to increase its market share

Barely a decade old and still emerging from manufacturing problems and the symptoms of macroeconomic turmoil, innovative American turbine manufacturer Clipper Windpower has latched onto a transformative new partner.

United Technologies Corporation (UTC), a Connecticut-based conglomerate with broad experience, proven abilities and deep pockets, shares a strong belief in Clipper's vision. That vision is that several small generators and a distributed drive train will lead to lighter turbines and cheaper electricity than traditional single-generator machines.

Late last year Clipper surrendered 49.5% ownership to UTC through a competitive bidding process. In turn, UTC pledged a \$0.25 billion, offered Clipper a new CEO from within its own ranks, added five names to Clipper's 11-member board of directors and agreed to purchase no additional Clipper shares for two years. UTC — home to

Sikorsky helicopters, Pratt & Whitney jet engines and Otis elevators, among others — posted \$52.9 billion in revenues for 2009.

Together, the companies intend to expand the market for Clipper's only product — the 2.5MW Liberty turbine — and strive to bring 5MW and 10MW versions to onshore and offshore markets within five years.

Clipper has sold 500 Liberty turbines since 2007 despite faulty gearboxes, bad blades, red numbers and unsteady stock. The California-based company still struggles with a sour economy that has rendered would-be customers short of project funding. But by the end of 2010 Clipper expects to raise prices, sell another 180 turbines, break even on the balance sheet and push into the global marketplace. Clipper believes its problems are largely in the past.

Perhaps more importantly, UTC believes the same. "We're looking to help Clipper," says Ari Bousbib, UTC executive vice-president and president of commercial companies. "We are simply a large shareholder and we can bring more

resources to help advance their vision of being a leader in the industry."

Although largely comfortable with letting Clipper be Clipper, UTC is keen to improve quality control on the manufacturer's output. "There are many developments and many ideas for new products," Bousbib says. "And for those, of course, we will seek to instill more discipline in the early stages of the development — at an earlier stage, perhaps, than might have been done in the past."

UTC examined the wind power sector for a decade, Bousbib says. And while not interested in developing projects, the company clearly recognizes lucrative opportunities from an exploding worldwide appetite for ever-larger turbines. Wind is a \$50 billion market today that has grown 25% a year for the past decade, says Bousbib. "Other than maybe elevators in China, I don't know many industries that have grown at 25% a year," he adds.

To that end, UTC intends to provide broad support as Clipper prepares to bring new wares to market. "We've got a tremendous amount of gearbox-related technology with UTC — especially with our aerospace companies," Bousbib says. "We've got a tremendous amount of blade-technology understanding within our Sikorsky helicopter business. On the technology level, we believe that there are capabilities that fit for wind power that we will be able to tap."

Foremost are UTC's formidable supply-chain resources, which Clipper is already beginning to explore. "We have developed a very advanced supplier base all over the world," Bousbib says. "So they'll be able to source components or sub-components, when appropriate, for their own needs from that UTC supplier base."

From the top

Financially challenged Clipper has 700-plus employees; UTC has a rock-solid financial footing and upwards of 200,000 workers in 71 countries. The symbiosis of the two companies will start at the top. Clipper's new CEO, Mauricio Quintana, took the reigns in March after only two-and-a-half years at UTC. Quintana turns 43 this month and has built a richly varied résumé that, although lacking direct involvement with wind power, lists executive stints at many companies, including notorious energy corporation Enron. As a management consultant for Booz Allen Hamilton, Quintana worked for oil giant BP, US Internal Revenue Service and the National Aeronautics and Space Administration (Nasa), where he spent three years on a project that re-engineered the International Space Station.

"I'm a geek at heart," Quintana says. "Celestial mechanics and aerodynamics — I know how it works." Quintana holds several patents and, for his university engineering thesis, designed and built a turbine that produced electricity from rivers and streams. He also gained significant experience running small companies and chuckles when reflecting on the frantic pace of his career. "When I was at Booz I put in 110 hours a week," he says. "And then, when I went to Enron, I worked 80-hour weeks. I thought it was a vacation."

Quintana was smitten with Clipper technology from the moment he first climbed a Liberty tower at the 125MW Cohocton project in New York. "Most people just see a blade on a stick," he says. "But there's a lot of thought behind the ergonomics — to the point that you would extend your arm and find a handle that you didn't have actual eyesight with,



Bigger and better
UTC will support Clipper as it brings new products to market

but could actually grab on to. What impacted on me was the ease at which the Clipper team was working through the turbine." The turbine's ingenuity is what struck him most about the project, he says, adding that the level of ingenuity must increase as turbines begin to break the 5MW and 10MW barriers. "As things get bigger," he says, "the level of complexity goes up exponentially."

Clipper is bringing those bigger turbines to market, but it has other plans, too. The company expects to expand sales into China, Europe and elsewhere — with foreign factories not out of the question. And, although expected to take decades, a 5GW South Dakota development in partnership with BP, dubbed Titan, has long been in the works. The project's 25MW pilot phase went online last year and a slew of super-size turbines at 5MW each could come in handy down the road.

Clipper manufactures all its nacelles in Cedar Rapids, Iowa, and puts gearboxes together from subcontracted parts from foreign and domestic suppliers. "We won't make the gears themselves," Quintana says. "But the assembly represents a lot of know-how that we have already and allows us to have control of how the gearbox is built."

The company currently imports all its blades from Brazil's Tecsis, but a domestic Clipper blade factory is on the drawing board. "Blades are a very important component of what differentiates the turbine from an aerodynamic perspective," Quintana says. "At Clipper we take great pride in our aero abilities and now they've been expanded with the presence of UTC. You don't want to be completely in the hands of your suppliers, especially when supplies are constrained as the demand picks up."

Already this year Clipper has managed a pair of

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triumphs. In February it began building a factory in Newcastle, England to manufacture 72-metre offshore blades for the elephantine 10MW machine — a blade prototype is expected in 2012. And in March, Clipper's first non-US wind farm — which saw 27 Liberty turbines come online in southern Mexico — received the 2010 Deal of the Year award from the Export-Import Bank of the United States. The 68MW project, owned by a subsidiary of France's EDF Energies Nouvelle, is backed by the bank's \$80.66 million direct loan. "That has opened the door to a lot of inquiries that we're following up," Quintana says.

Although the Clipper concept was born around 2000, the company truly sprang to life in 2002 after winning a US Department of Energy grant for designing a turbine that delivers 2.5MW but matches a typical 1.5MW machine in up-tower weight. By 2005, a test turbine was turning in Wyoming and the first eight commercial machines went into service in 2007 on the shores of Lake Erie, New York.

But just as US turbine demand was reaching its peak, trouble came calling. Clipper's first 150 gearboxes needed rework, as did more than 1,000 blades — expensive remediation that displeased the firm's shareholders. Yet the company clawed back some expenditure when field technicians developed a method for removing blades using ordinary industrial trucks — eliminating the need for expensive crane call-outs (*Windpower Monthly*, April 2010). Liberty's original design had already included an onboard jib crane for removing the four generators.

Then last year, just as remediation wound down, UTC bested three other firms to win the partnership bid. Would



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such an exacting partner have helped Clipper sidestep its blade and gearbox problems right from the beginning?

"Without a doubt," laughs company founder Jim Dehlsen. "Clipper was a bold entrepreneurial move. It was coming into a mature market in 2000, 2002, 2005 with new technology — not for the faint of heart. We could have done things differently and better. But, in all, given the resources that we had, I think it was a pretty nice accomplishment."

Now in his 70s, Dehlsen is pleased with the new partnership and had already given up the company's reins in 2008 to recently exited CEO Doug Pertz. "For an entrepreneurial person like myself, there is a challenge to that," Dehlsen says. "At the same time, it gets down to who you're working with, and the entrepreneurial days of Clipper are really fading into the background now. It's much more of a larger, structured corporate entity."

Dehlsen now divides his time between Clipper and his son's wave-energy start-up enterprise. So as Clipper enters a new phase, does the founder believe, as turbines continue to get larger, that using multiple generators and a distributed drive train actually produces incrementally cheaper electricity — the premise the Liberty turbine set out to prove?

"We believe it does," Dehlsen says. "However, what you'd have to work your way through is the inefficiencies of starting up a new company — the supply chain being formed, all the teething stuff that we had to go through, the inefficiencies and so on. But I believe once we hit mid-scale operation, we'll find that it's going to be a pretty competitive machine." ||W

AHEAD OF ITS TIME SOWING THE SEEDS FOR A WIND INDUSTRY PARTNERSHIP DEAL

Thirty years ago, as United Technologies Corporation (UTC) fashioned a futuristic 4MW prototype wind turbine, it also sowed an unlikely seed for the partnership with Clipper Windpower that came to fruition late last year.

It was 1980 and turbine capacity was measured in kilowatts. The big names in manufacturing included Boeing and Alcoa. And UTC's Hamilton Standard aerospace subsidiary had just built a 3MW prototype in Sweden. It then won a \$5.9 million US Interior Department contract to build an even larger machine, known as the WTS-4.

By 1982 the turbine's two 40-metre blades were turning in Medicine Bow, Wyoming — producing power until the right-wing Republican administration of Ronald Reagan gutted federal wind power support as the decade unfolded. That lack of support, along with a worldwide oil glut, scuttled plans to deliver 20 of the machines to Hawaii for an 80MW project.

As the domestic wind industry began to recover in the 1990s, turbine sizes hovered well under 1MW for many years. They still averaged less than 1.75MW in the US as recently as 2009. So in 2005, as Clipper readied its innovative 2.5MW turbine that included four generators and a distributed drive train, the machine was seen by many as an unpromising departure from the modest-sized norm — not unlike the WTS-4.

But although Hamilton exited from wind and eventually became known as Hamilton Sundstrand, the company continues making advances in aerospace technology. And last year, as UTC began forming a due-diligence team in advance of its \$0.25 billion bid to partner with Clipper, it

called upon a pair of long-time Hamilton engineers who had worked on the WTS-4.

"They worked on the Hamilton wind project and they continued at Hamilton since then, doing other things related to gearboxes and blades," says Mauricio Quintana, Clipper's new CEO. "They're both excellent. That's why a lot of people were sceptical about the Clipper design, whereas UTC saw a lot of innovation."

Clipper founder Jim Dehlsen was among those keenly aware of the Hamilton Standard WTS-4 back in the day. A book he read in the 1980s delved into the topic and he visited the Medicine Bow test site in the mid-1990s. "The machine had been abandoned and I thought I could probably buy it for about \$25,000,"

Dehlsen says. "As it turns out, there's an engineer who actually did buy it and worked on it and, I think, got it back operating. It was a really amazing machine for its time."

Dehlsen believes the WTS-4 was dismantled sometime in the late '90s or early '00s. But the overall experience made an impression and years later, when Clipper sought a test site for its prototype machine, Medicine Bow became the logical destination. Clipper's 2.5MW test turbine was erected in 2005 — five or ten rotor diameters from where the WTS-4 had stood, says Dehlsen.

Over the years, California-based Clipper and UTC crossed paths. Somewhere around 2002, Dehlsen visited UTC's base in Connecticut to explore licensing the company's retractable-blade technology and applying it to wind power — an idea that still intrigues Dehlsen. "There've been some intersections that are kind of interesting," he says. "I think I've had UTC in my blood for a long time."



Mauricio
Quintana