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A Temporary Solution

Siemens teams with Herchenbach to build semi-permanent warehouses on site for wind-turbine repairs.

By Laura Wilms

The repair of wind-turbine generators involves transporting damaged components long distances to repair workshops. As the components are often large, this logistical effort results in enormous costs.

Siemens Service Wind Power has opted for a different solution: The leading manufacturer of wind-turbine generators has teamed up with temporary building manufacturer Herchenbach to develop a semi-permanent warehouse that will be used for repairs and maintenance at the turbine's site.

Wind energy is one of the leading forms of renewable energy. And with good reason: Wind is an inexpensive and clean raw material with an endless supply. The investment costs of wind-turbine generators also pay for themselves quickly. But that only can happen if the generators run as smoothly as possible over their service life of 20 to 25 years. High maintenance costs, on the other hand, quickly lead to higher operational costs that translate into reduced revenues for turbine-generator operators.

"Wind-turbine generators must be a worthwhile investment, both from an ecological and an economic point of view," said Mark Borkenhagen, project manager at Siemens Service Wind Power, the world's leading manufacturer of wind-turbine generators. "Advancements in

Herchenbach temporary buildings can be installed without any foundation on almost any surface.



Siemens

rotor-blade design and generator technology have already allowed us to continuously improve the efficiency of our wind-turbine generators. However, in order to make wind power competitive versus conventional forms of power generation, every cent that we can save in terms of maintenance is crucial.”

MINIMIZING MAINTENANCE COSTS

A key factor in this respect is the replacement and repair of individual components. Previously, when a repair became necessary, the damaged large parts of wind-turbine generators had to be transported to workshops as special heavy loads, in most cases involving long trips from wind-farm sites. Each heavy load had to be registered with the relevant local authority and was only allowed to be transported at night.

“The wind-turbine generators stand idle until the repaired parts are returned,” Borkenhagen said. “And each hour of downtime causes significant losses.”

So Siemens Service Wind Power started looking for an alternative. The answer seemed simple enough: install a temporary building for repairs on the actual wind-farm sites. A temporary and convenient repair site would help avoid the expensive and time-consuming transportation of heavy loads.

Siemens wanted to use the new semi-permanent warehouse solution in Europe, so it had to be possible to quickly install and dismantle the building, so it could travel from wind farm to wind farm as required. The warehouse also had to be able to withstand extreme wind loads and be big enough to house the — sometimes huge — turbine parts as well as the repair equipment.

“Wind-turbine generators have a diameter of over four meters, measure three meters in height and weigh (88 tons),” Borkenhagen said. “Such dimensions do not fit into any standard temporary building. What was required was a special solution.”

Siemens chose Herchenbach Industrie-Zeltebau GmbH, a manufacturer of temporary buildings and semi-permanent warehouses made from aluminum, to tackle this challenge. Other divisions of Siemens already had worked successfully with Herchenbach in the past. The result of this project was a special Herchenbach Heba-Fix® temporary building, 33 feet wide and 49 feet long with a side height of 21 feet.

LOWERED THROUGH THE ROOF

The main design challenge was the question of how to get the wind-turbine parts into the building since they



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wouldn't fit through the sidewalls due to their massive size. Siemens Wind Power initially wanted to build the temporary warehouse around the generators for each repair.

"This would have been very time-consuming, thus unnecessarily prolonging the downtimes again," Borkenhagen said. In addition, the complexity and vulnerability of assembling a building around such a large main component was a risk.

So Herchenbach developed a special temporary building solution. The basis is a corrosion-free, premium-quality aluminum frame and a combination of high-quality PVC industrial-grade tarpaulin in the roof as well as trapezoidal sheet metal and tarpaulin walls. This allows the roof to be partially opened up, so the parts needing repair can be lowered into the building through the roof opening with a crane.

This involves pulling a part of the roof tarpaulin out of the aluminum frame, a task performed manually by three-to-four employees fairly easily. However, the frame and the components had to be planned and designed with particular precision for this purpose.

"Even when the roof tarpaulin is temporarily removed, the structure

has to remain stable in spite of high-wind loads," said Tobias Raeber, managing director of Herchenbach. "We therefore incorporated robust steel trapezoidal sheet-metal walls and further reinforcements into the lateral middle sections of the temporary building at the point where the roof tarpaulin can be pulled out. These provide additional stability, making the building withstand high loads."

Another advantage of the Herchenbach temporary buildings is they can be installed without any foundation on almost any surface. This is a crucial factor, particularly at wind farms, where simple compacted gravel surfaces or smaller asphalted parking areas are available. This is made possible by the building's comparatively lightweight aluminum frame (in contrast to steel) and a special ground-anchoring solution. During installation of the structure, steel-base plates are fixed at regular intervals by driving nine earth pins up to 4.3 feet into the ground through each plate.

EUROPE-WIDE USE

In addition, temporary buildings from Herchenbach are ideally suited for temporary use at different loca-


tions because of their modular design.

"All components are bolted or fitted together; nothing is permanently welded," Raeber said. "This means that the buildings can be quickly dismantled at any time and put up again at other locations."

And hardly any spare parts are needed, he said.

This approach already has proven itself in practice. The temporary building supplied to Siemens Service Wind Power was installed for the first time — within 24 hours — in fall 2015 in the Picardie region of northern France. After four repairs, it was uninstalled. The building was then put into storage until its next use in January in Tinglev, Denmark.

"Here, too, the installation went smoothly," Borkenhagen said. The structure will remain in place in Denmark until it is needed at another location.

"We have therefore achieved our objective of rotating the new temporary building around the various wind farms in Europe," Borkenhagen said. "And that really does work without too much time-consumption, and our costs are a fraction of what they were with the old method of transporting heavy loads." 

SgurrEnergy Gets O&M Contract for Inch Cape Offshore Met Mast

Leading renewable energy consultancy, SgurrEnergy, has secured an operations and maintenance (O&M) contract for the Inch Cape Offshore Met Mast off the coast of Angus, Scotland.

Installed in 2014, the offshore met mast gathers accurate wind resource, velocity and directional data, and oceanographic data to inform the development of the 784 MW Inch Cape Offshore Wind Farm.

SgurrEnergy, a Wood Group business, was appointed by met

mast supplier Drace Infrastructures UK Limited on behalf of Inch Cape Offshore Limited (ICOL). The scope of the 16-month contract includes offshore inspection and maintenance, recertification, project management, weather forecasting, data recovery, and detailed reporting through Sgurr-DataPortal.

In addition, the role includes the provision and installation of calibrated instrumentation and spares as well as onshore monitoring and coordination from SgurrEnergy's

24/7 control center in Glasgow. The SgurrEnergy 24/7 control center will track the movement of vessels and personnel offshore.

"We are pleased to welcome SgurrEnergy to our O&M team on this innovative offshore met mast project," said Hugh Morgan, asset manager at Inch Cape Offshore Limited. "Continued application of best practice O&M management of this asset is essential in order to continue to provide valuable data and in doing so, to significantly increase the confidence

The offshore met mast gathers accurate wind resource, velocity and directional data, and oceanographic data for the Inch Cape Offshore Wind Farm.

and certainty of the Inch Cape Offshore Wind Farm's wind resource."

"We are delighted to have secured this contract for the Inch Cape offshore met mast, and will look forward to working closely with ICOL and Drace to ensure the high availability of detailed and accurate data," said Robbie Gibson, director of asset management at SgurrEnergy. "Being awarded this contract further strengthens SgurrEnergy's position as a leading turnkey offshore O&M service provider."

The project is expected to bring benefits through a reduction in greenhouse gas emissions, energy supply and security, and economic benefits from job creation and infrastructure development through the project life. ↘

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PERSPECTIVE

Maturing the Wind Industry: OEM Aftermarket Support after Midlife

By Shawn Lamb

While at my local automobile service shop waiting for my truck to be serviced, I drew some parallels between the well-established automotive industry and the up-and-coming wind industry — specifically about the lack of options for post-warranty, aftermarket support.

For example, at a repair shop, I have two options: Within the warranty period, the manufacturer requires a certified OEM shop for repairs, or I risk voiding the warranty coverage. After my warranty expires, I may choose to continue on with the OEM or find a non-OEM shop. If I trust the third-party mechanics and if they perform good quality work and, most importantly, if they

have much more reasonable prices than the OEM shop, then I probably will leave the OEM. When I have to replace parts, I am aware the independent shop

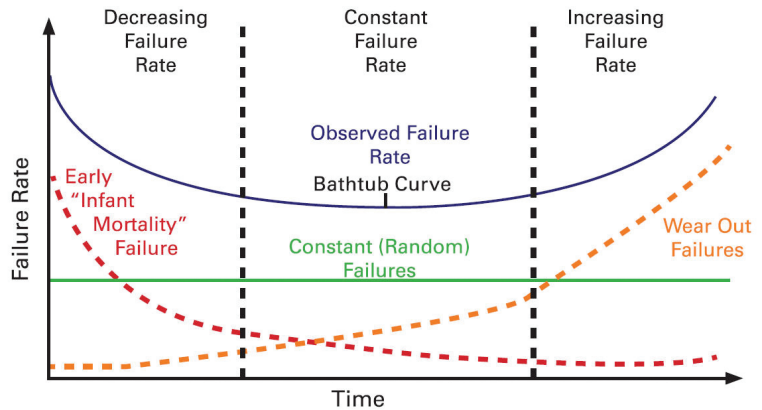


Figure 1: Failure Rate Evolution

may have to purchase them from the manufacturer, but they also may suggest after-market parts that will save money or perform better. The American automotive industry is a good example of a matured industry that uses free-market solutions to help the owners succeed.

Now imagine if my truck had to be maintained only by the OEM or suffer a major degradation in performance and get cut off from industry expertise and spare-parts availability. Imagine the vehicle manufacturer refusing to work with any independent shops and making it so difficult for these shops to function that your vehicle couldn't be fixed and would have to sit in the back lot, rusting. This would be an impossible situation for the owner and obviously would factor into future purchasing decisions as well as recommendations to colleagues, friends, and family. The latter situation is analogous to our burgeoning wind industry.

Many wind owners and operators are forced to find cheaper service and spare-parts solutions after the warranty period ends just to meet their operational expense (OPEX) budgets. These options might include a third-party indepen-

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dent service provider (ISP) or performing maintenance and repairs with their own crews. It's at this crucial point that the OEMs need to have an aftermarket presence. Their expertise and experience are important in order for the owner to weather the storm of end-of-life problems that show up in 10 to 20 years.

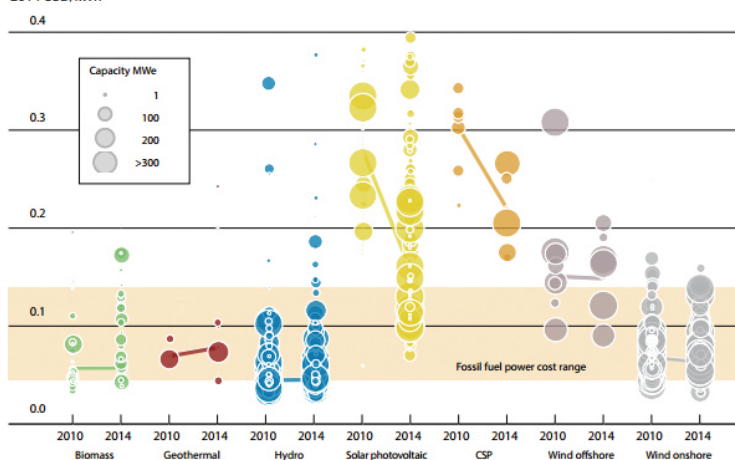
Many of the OEMs have no turbines in the megawatt class old enough to benchmark the midlife and beyond. Both the owner and the OEMs are in uncharted territories when it comes to turbines 10 years old or older in the megawatt class. The OEMs are still beta testing their models on the owners and operators. However, when the owners may assume that their financial models are stable, they negate the uncertainty of these unproven machines.

It's understood most OEMs want to not only sell a wind turbine, but also make another income from service and parts. This works nicely for the owners and operators who contract a "full-service agreement" over many years. This helps ensure OEM support in order to transfer the risk and stabilize the financial model. Many OEM companies and sub-suppliers will work with owners to develop strategic relationships early on, but in the later years, the profit margin is not there to support a full O&M contract by the OEM.

Owners can decide what they want to do with their assets post warranty (usually two to five years). Options include: hiring an ISP to maintain their assets, staying with the OEM on an "extended warranty," or even self-performing with their own workers and back-office support. In order to be competitive, the independent power providers (IPP) will sell wholesale electrons below 2 cents/kWh on a spot market. These margins are slim, and many IPPs are struggling to make a profit at or above projections.

The wind industry as a whole is being driven to sell wholesale closer and closer to grid parity, or the average for conventional power plants. The future of wind as one of the cheapest sources of elec-

2014 USD/kWh



tricity also implies site operations must be one of the most efficient in power generation.

The pressure to make a profit is increasing as margins disappear. Add to that the fact most sites in the U.S. given a Production Tax Credit (PTC) from the government also will be facing

a completely new OPEX budget after 10 years. OEMs and their sub-suppliers will need to adjust their businesses to support independent aftermarket efforts by the third-party suppliers, owners, and operators. This is imperative for the longevity and maturity of the wind industry. ↴

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