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Bolting Technology for the New Year

By Hank Surface

The tides are turning from the misinformed belief that hydraulic power pack systems are still the most relevant and accurate ways to torque. As we enter the new year, we need to focus on the ever-expanding bolting solutions that are available. While it may seem like a hindrance to incorporate new technology, electronic torquing is easier to use and boasts undeniably better results. If you do not torque correctly, accurately, or with repeatability, you cannot do anything else. From the basement to the blade bolts and everything in between, you have to be certain that you are achieving the correct torque that has been designated.

Efficiency is king when it comes to scheduled maintenance, and hydraulics no longer wear the crown. For example, in the same amount of time it takes to set up, torque a tower section, and prepare for the next section with hydraulics, all tower sections could be torqued. Each bolt would be recorded automatically with the exact torque applied, and the technician would not need to make a costly trip to the chiropractor before hitting the yaw deck.

New tooling varieties such as the E-RAD BLU and Smart Socket technology make it more appealing to all site personnel, from the project manager having exact readings and torque transmitted via Bluetooth when he wants, to the wind technician that has effectively lost more than 50 pounds of bulky bolting hydraulic equipment. Smaller footprints mean more production and faster deadlines. You have to be certain that you are achieving the correct torque that the OEM has designated. Too much, and you would have fatigued the jointed material and bolt; too little, and it rattles, becoming loose. Accidentally turning the knob on a hydraulic pump can exponentially increase the hydraulic tools torque and leave you with a sheered bolt wreaking havoc in the hub or worse.

There are some key differences between hydraulic and electronic wrenches. Electronic precision torque wrench tools, for example, are designed to provide a high degree of accuracy, plus or minus 2.8 percent, and repeatability of plus or minus 2 percent using a more efficient planetary gearbox design and the precision of an electric AC servo motor. Having control with the touch of a finger further demonstrates the increasing differences from the hydraulic predecessors.

Risk mitigation is also deeply engrained within hydraulic torque wrench alternatives that could not be implemented into hydraulic power pack systems. Introducing an engineering control for safety trumps individual personal protective equipment and costly equipment training. For example, with electronic torque wrench systems, the tool operates at extremely low noise levels at only 75 decibels, meaning you can be safer knowing you will hear your radio when the booming and unforgiving weather conditions such as thunder and lightning comes unexpectedly.

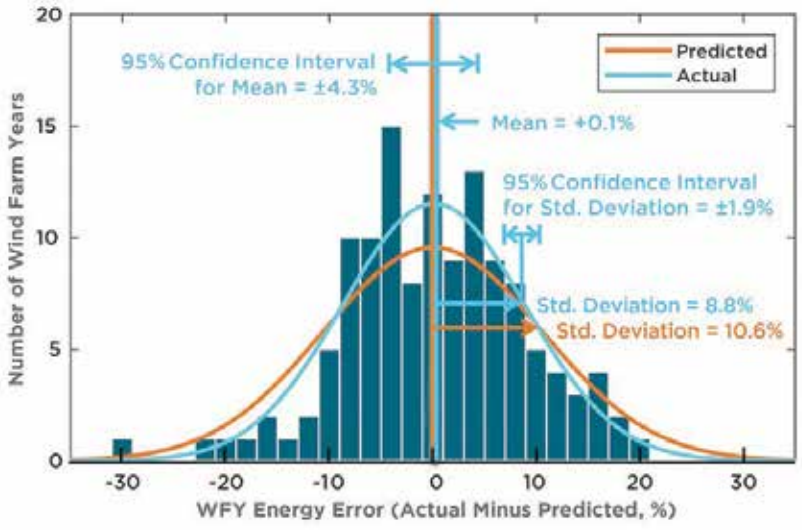
Data collection software allows for the most absolute traceability and transcription of data in a simple plug-and-play or wireless connection. With safety and risk management being the biggest concern, electronic torque wrenches have LED indicator lights such as pass or fail located on both sides. These visual signals indicate the status of torque procedure for maximum accuracy as well as fast and convenient error-free digital single increment torque settings.

The wind industry is consistently

improving for the better. Electronics are now becoming the go-to choice due to their accuracy and repeatability. From years of calibrating hydraulic tooling in an ISO/IEC 17025:2005-accredited hydraulic calibration laboratory, most hydraulic wrenches have an OEM-specified accuracy of 5 percent. While this is a good standard, it is only 50 percent as accurate of what electronic torque wrenches are capable of. Hydraulic tooling kits has to either be flown up in a box (if the specific model supports an outward hoist) or carried. The setup alone for torquing with hydraulic wrenches can be more than the time it takes to accomplish the task at hand. Electronic torque wrenches clearly surpass the equivalent tooling that would be needed by hydraulics for speed. Instead of using a pen and some paper, you can simply press a button on a calculator, eliminating that possibility for error.

ALSO IN THIS SECTION

VAISALA VALIDATES ACCURACY OF WIND ASSESSMENT METHODOLOGY



Vaisala

Vaisala Wind Assessment Validation Histogram

Vaisala, a global leader in environmental and industrial measurement, recently performed an extensive validation confirming the accuracy of its state-of-the-art energy assessment methodology. The results of this assessment validation process have revealed that the wind projects in the validation study performed within 0.1 percent of Vaisala's pre-construction estimates during the years analyzed on average.

This statistic is based on a comprehensive analysis of 30 operational wind farms, totaling 127 wind farm years. Of the years encompassed by the study, 90 percent were between 2010 and 2015, providing a significant sample size while still ensuring that projects' measurement techniques were up to modern standards. The results confirm that Vaisala's calculations are calibrated and in line with P50 wind energy estimates.

For the last decade, underperformance has been a key concern of the wind industry, and investigations have revealed that more sophisticated assessment methods are required to improve pre-construction energy estimates during the due-diligence phase.

While Vaisala's approach to energy assessment follows many of the standard practices that are familiar to the industry, it has also introduced several new innovations.

For example, Vaisala pioneered the broad integration of numerical weather prediction (NWP) models into the wind resource assessment process and works with ensembles of all the leading global reanalysis datasets to more accurately characterize the impacts of climate and weather at a project.

The company also relies on full time series data rather than averaged quantities to show the influence of unusual weather patterns more realistically. In addition, it has developed a next-generation uncertainty model known as the Energy Risk Framework that captures risk at every step in the assessment process, incorporating complex dependencies ignored in classical approaches.

"Our techniques move the industry forward by addressing shortfalls in the standard approach," said Matthew Hendrickson, global manager of energy assessment at Vaisala. "The advantage of using next generation methods like NWP modeling has already been demonstrated in recent industry validation studies. The transparency of our method and how we communicate risk makes our science accessible to clients, building confidence and trust. As a responsible player in the industry, we felt it critical to validate our methods and answer the simple question of how well we predicted actual plant production."

With advantages in both modeling technique and risk characterization, Vaisala has gained respect with a number of global banks and investors, increasingly becoming their preferred choice. Today, the company is in regular outreach with key investors and is working toward universal acceptance of its approach.

"While these results are encouraging, this study is only the first cycle of a perpetual feedback loop," Hendrickson said. "As technology evolves and greater sophistication is required, this ongoing validation process ensures that Vaisala continues to lead the industry with cutting edge-science while maintaining an accurate and calibrated wind assessment process."

— Source: Vaisala

For more information, go to www.vaisala.com/energy.

PRODUCT

IRONCLAD™ GROUT SLEEVES

NTC Wind Energy is pleased to offer its patent-pending IronClad Grout Sleeves. This product will save time and produce a better foundation for wind turbine generators.

The IronClad Grout Sleeve is a tapered polypropylene sleeve that is 3 1/2 inches tall with a slightly funneled flange at the base. The sleeves are tapped down over the bolts in the grout trough in place of foam rings. Once installed, they will protect the bolt from contact with grout and prevent grout from going down into the bolt sleeve. They grip tightly to the bolt and will not float in the grout.

For example, a foam ring that is 1 5/8 inches in diameter and 1/2 inch thick will displace 2.55 square inches of grout. At 144 bolts, the foam is displacing 367 square inches of grout in the foundation. If the grout has a compressive strength of 12,500 pounds per square inch, 4,594,590 pounds of compressive strength would be lost in that foundation. That amounts to nearly 2,300 tons of lost strength due to the voids created using foam rings. Grout sleeves displace almost no grout, resulting in a considerably stronger foundation.

IronClad Grout Sleeves project approximately 1 inch into the base flange when the base is set. The top leading edge provides the added benefit of sealing the area immediately below the flange. This prevents any potential for the grout to interfere with proper tensioning.

There's no need to cut foam rings and tape them around each bolt any longer. IronClad Grout Sleeves are quick and easy to install and are priced at approximately the same cost as foam. They are also approved for use by all major engineering firms in the industry.

— Source: NTC Wind Energy

For more information, go to www.NTCWind.com.