Torqueing and recording it

What is torqueing and why is it important to be able to record it? PES finds out from Norbar, the torque tool specialists.

In this context, torqueing is principally the measured application of rotational force to a threaded fastener. When the torque is either under or over the manufacturer's specification, it can cause considerable damage to the turbine structure. Protecting against this risk should be of primary importance so the health and safety of operatives and the life expectancy of the turbine are safeguarded.

The extent of the damage from inaccurately applied torque can vary substantially. The potential for vibrations occurring in the turbine is perhaps the most crucial technical implication of over or under torque. Any vibration presents a real risk of calamitous failure.

Maintenance operatives across many windfarms need to use an assortment of tools to finish the job. In the turbine tower for example, an operative may need one tool to run down the bolts plus a hydraulic wrench to achieve final torque. Using these two tools present a number of potential complications, particularly regarding ease of operation and manoeuvrability. Subsequently health and safety is a significant concern. Therefore having the ability to record the torque data from tightened joints for audit purposes would be a distinct benefit.

Furthermore, when triggering electric multipliers on pre-tightened bolts, a dangerous over-torque can occur due to the slow response time of controllers, high motor start currents and high motor inertias. In some instances, this over-torque can be in the region of 100 percent. When triggered multiple times in this type of condition, there is an extreme danger that the application may fail due to the overstress of the joint.

So, just what is the solution? There is a clear need for a tool that will tighten bolts accurately to the required torque, audit pre-tightened bolts, and can then record this data is needed.

Such a solution does exist and in a single tool. Norbar's EvoTorque®2 enables the user to, accurately and reliably torque bolts; generate a record to confirm the fact; and provide complete traceability for Operations & Maintenance teams and their clients.

In response to customer feedback from many industries Norbar has added data memory and transfer capabilities and audit mode to the features and benefits of the original EvoTorque tool. The outcome, EvoTorque2, is a product capable of incredible control in tough conditions. Where bolts have not previously been tightened it will deliver torque values with

an accuracy of ±3 percent. Where torque is re-applied to a pre-tightened bolt results are within ±5 percent of set torque.

When performing a retightening test, the EvoTorque2 also demonstrated a clear advantage whereby, when triggered 18 consecutive times on an already tightened bolt, it achieved a total accumulated over-torque of around 15-20 percent of the set torque; depending on the hardness of the joint. Undertaking so many consecutive applications using traditional electric tools would almost certainly result in failure of either the tool or bolt. EvoTorque2 can provide more reliable torque results than conventional tools, thus eliminating the need for a hydraulic wrench to complete final torqueing.

The output of most electric motors reduces as the motor temperature increases with use, resulting in less accurate torque values. EvoTorque2 accuracy will not change as a result of ambient temperature or motor temperature, thus enabling numerous joints to be tightened successively with trusted results assured.

Power on windfarm sites is usually provided by small generators with long cable runs, this raises concerns about the quality of the power supply. The implication is that most electric tools either will not run or their torque output becomes erratic. EvoTorque2 tools are largely immune from the effects of voltage fluctuation due to its motor controller technology; the tool will either run accurately or indicate that the voltage is outside of tolerance.

New complimentary PC software, EvoLog facilitates data management and tool configuration with a multitude of benefits. Every torque and angle value that EvoTorque2 applies can be recorded with a corresponding date and time stamp. Up to 3,000 such readings can be stored in the tool's memory. These can be downloaded to a PC with a USB cable or transferred wirelessly via Bluetooth® Smart for analysis at a later date.

Torque, Torque & Angle, and Audit are the three modes of operation. The first two enable users to select torque only or a combined torque & angle target respectively. The new Audit mode permits the checking of pre-tightened bolts, and thus ascertains if the bolt was previously under-torqued, and what change has occurred, before retightening the joint as needed.

Up to 12 user IDs can be downloaded to EvoTorque2 and results stored against individual users, a helpful control where tools are shared across multiple users, e.g. different shifts. Work IDs, that is specific targets i.e. torque, or torque & angle, can be set up e.g. for a specific nacelle or base bolt. Up to 12 work IDs can be put in a work group and up to 5 work groups can also be set up. This enables audits of not just the bolts of a single tower to be performed easily, but of all the towers in a windfarm, and even the bolts across multiple farms.

Independent tests

Additionally, in independent tests and calibrations conducted across a number of Spanish windfarm sites; EvoTorque2 achieved the OK/PAA/APPROVAL standard. This makes them the only electric multipliers permitted for use to perform final torque on a number of windfarm sites. Also EvoTorque2 features a third party verified sound pressure which does not exceed 70 dB (A) and a vibration level of 0.304 m/s² which significantly reduces any possibility of medical or health and safety related issues such as hearing loss or White Finger, during use.

Both products are available in 110V and 230V versions and crucially are weather sealed to IP44. The range covers requirements from 100 N·m to 7,000 N·m although the 2,000 N·m tool satisfies most windfarm applications. The products can be serviced and calibrated locally through a growing network of international Norbar distributors who have a great deal of wind industry experience.

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