

CNC Onsite develops precision tool for milling 10-meter wind turbine flanges

Precise flange connections in tower bases, monopiles and transition pieces from Danish "Goliath": maintenance costs, reliability, service life improved

VEJLE, DENMARK, June 2, 2022 /EINPresswire.com/ -- ([CNC Onsite](#)). The increasing dimensions of wind turbines operating in harsher offshore environments create engineering challenges for large flange connections that join wind turbine towers to their foundations. To prevent bolts loosening – an issue often associated with significant repair costs and downtime – the connecting flanges must be flat to within millimeters.

Capable of two-millimeter accuracy, "Goliath", to be launched by Danish machining tool expert CNC Onsite in autumn 2022, can mill flanges of tower bases, monopiles and transition pieces of up to 10 metres in diameter.

A critical mechanical joint within the wind turbine structure, large flanges are technically complex to mount reliably, requiring pairs of matching surfaces fixed in place with bolts. After the manufacturer has welded the flange into the structure – a process that often warps the flange – the surfaces have traditionally been corrected by hand using heat treatment to produce similar skewness. Goliath, however, achieves fine tolerances as part of the production process post welding by milling, grinding and grooving the flanges to create faces with the required structural fit.

Bladt Industry to incorporate precision flange milling

"We constantly develop our manufacturing to ensure we can deliver the right products with the right tolerances that the industry requests. With larger flanges, integrating Goliath into our



The large flanges on offshore windturbine for tower bases, monopiles and transition pieces need millimeter precision so bolts do not loosen over time.

manufacturing process will allow us to continue to do just that,” says Klaus Munck Ramussen, Senior Vice President, [Bladt Industries](#).

With offshore requirements driving ever-growing turbines, the wind energy industry continues to innovate, integrating suppliers’ technology into their manufacturing processes. As a longstanding supplier of foundations and transition pieces, Bladt Industries exemplifies this trend.

“We are proud to support the development of the industry and, by securing the tolerances, we contribute to securing the integrity of these large structures and thereby the production of green power for many years,” he adds.

CNC Onsite has applied its long experience in developing and operating flange milling machines to Goliath, making it stiffer, stronger and more precise than the previous machines.

“Obtaining a global flatness of a couple of millimetres on a four to five metre diameter flange can be challenging enough, but obtaining the same result on today’s eight-plus metre flanges is simply not possible with previous methods,” explains Søren Kellenberger, Sales Director, CNC Onsite.

“

We constantly develop our manufacturing to ensure products have the right tolerances. With larger flanges, integrating Goliath into our process allows us to continue to do just that.”

*Klaus Munck Ramussen,
Senior Vice President, Bladt
Industries*

“Once it is up and running in the autumn, we would not be surprised if we can obtain even better tolerances,” says Kellenberger.

Flatness and fatigue can affect bolts

Achieving the best possible fit between the wind turbine tower flange and its base during the manufacturing process reduces the requirement for routine retightening and associated downtime, also potentially leading to longer wind turbine service life.

“Because incorrect bolt tension is so problematic, the industry has long aspired to maintenance-free bolted connections that require two criteria: sufficiently flat flanges and correctly tightened



CNC Onsite's new tool works automatically using pre-pogrammed parameters, milling to within two millimeter accuracy

bolts,” explains Kellenberger.

“Today, reliable bolt-tightening methods are available to manufacturers. If the flanges are skewed, however, the bolts can still fatigue, even break, potentially leading to a complete collapse of the turbine,” adds Kellenberger.

With Goliath, a solution that delivers precise flange flatness is now on the market, which together with precise bolt tensioning, will help to secure the integrity of the structures and therefore reduce maintenance costs.



CNC Onsite's Goliath works automatically and delivers millimeter precision for large flanges of up to 10-m diameter

An offshore wind turbine standing idle can cost more than 8,000 euros a day, with transport and labor costs coming on top. Maintenance over the lifetime of a wind turbine can represent up to a quarter of all costs.

Flange-milling solutions for all turbine towers

In addition to Goliath, CNC Onsite offers a range of in-house flange-facing tools that cover diameters from 1.8 to 10 meters.

“Working automatically using pre-programmed parameters. Goliath, which can work both horizontally and vertically, can cope with features on large flanges such as double-tilted flanges and requirements for parallelism of the flange surfaces,” says Kellenberger.

Designed to work quickly without compromising the high-precision work, the tool carries out some steps simultaneously to save time.

“The Goliath machine can manage the many new complex flange designs, making it probably the most advanced and precise flange milling tool on the market,” adds Kellenberger.

CNC Onsite applied its 10 years of experience of in-situ onshore and [offshore flange repairs](#) to develop Goliath.

About CNC Onsite

Headquartered in Vejle in Denmark, CNC Onsite designs and delivers high precision mobile machining for wind turbines including offshore foundations. Machinery built by CNC Onsite are designed to be flexible using its proprietary "building blocks" approach, which means machinery

can be built to match a range of tasks. CNC Onsite serves the onshore and offshore wind energy sector delivering as standard solutions: machining of large diameter steel flanges and blade root ends; specialized repair services covering yaw ring, inserts in blade root, rotor lock, generator shaft, bearing housing and threaded holes. Removal and replacement of worn and broken bolts round off the offering.

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