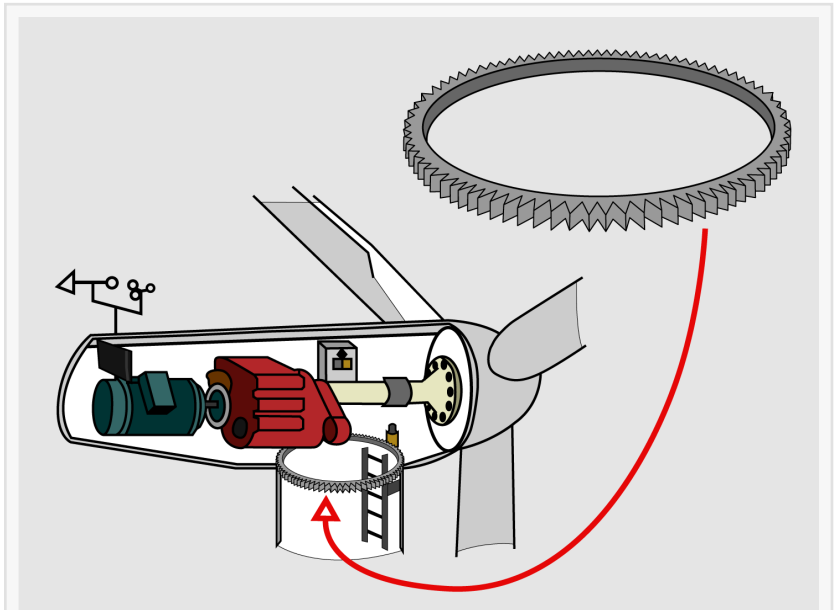


Patented yaw ring repair makes wind turbine lifetime extension viable

Reliable yaw ring repairs can extend wind turbine life; Repair vs replacement: CO2 reduction; In-situ machining tool portable and separable for uptower use

VEJLE, DENMARK, March 3, 2022 /EINPresswire.com/ -- A new invention for repairing yaw rings in-situ is expected to make a major contribution to extending the lifespan of wind turbines. Developed by Danish machining expert [CNC Onsite](#), the patented system means the yaw ring does not need to be replaced, eliminating the expensive, time-consuming and potentially detrimental disassembly of the rotor and nacelle.



The yaw ring located between the wind turbine nacelle and tower is complex to replace

A crucial component in securing maximum power production from a wind turbine, the yaw ring, also called a “yaw gear rim”, is complex to replace. Yaw ring replacement costs are so high that broken or worn teeth can leave operators of older wind turbines with little choice other than scrapping them.

“

We offer a repair service for both onshore and offshore at a fraction of the cost of replacing the entire yaw ring. That makes it viable to keep perfectly good wind turbines operating for longer”

Søren Kellenberger

“This inspired us to develop a repair method as an alternative,” Søren Kellenberger, Sales Director, CNC Onsite.

“We can now offer a repair service for both onshore and offshore at a fraction of the cost of replacing the entire yaw ring, and that makes it viable to keep perfectly good wind turbines operating for longer,” he added.

Patented portable precision tool

The CNC Onsite method employs a portable precision machining tool to repair any broken or

worn yaw ring teeth. Operated by a specialist engineer, the tool applies the [patented method](#), working at extremely fine tolerances, to remove and reinsert machined teeth. The patent for the system covers the milling process by which the damaged teeth are excised, and the bed created for the new part, as well as its particular insertion method.

“The process we apply when creating new yaw ring teeth for a wind turbine is similar in principle to a new dental crown that is first copied precisely then fitted by a dentist using precision tools,” Kellenberger said. “The aim is the same, and it should last for a long time.”

The machining tool has been designed to break down into component parts with a low weight that allows them to be transported in the tower elevator to the work area. After reassembly in the nacelle, the compact tool can be operated in the confined working space around the yaw ring.

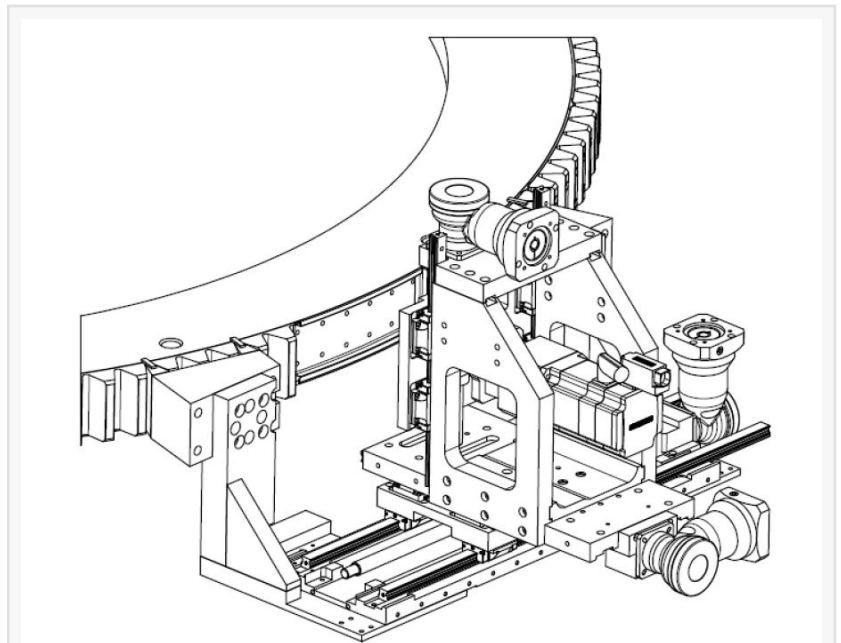
Not weather dependent

The repairs are carried out inside the wind turbine tower so can be completed irrespective of weather conditions.

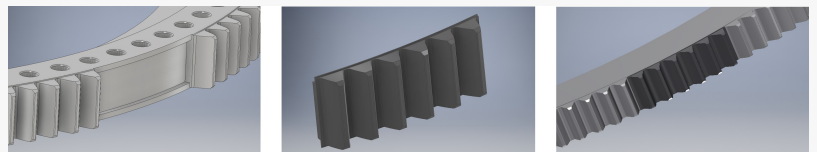
“As long as it is safe to travel to and access the wind turbine, we can carry out the repairs. So there are far fewer days when we cannot work. This is also good for both work schedules and costings,” Kellenberger explained.

Scale of the problem

Mounted at the top of the wind turbine tower, the toothed yaw ring is a gear that engages with motors mounted on the nacelle to align the rotor blades with the wind. CNC Onsite estimates that turbines on some 5 to 10 percent of wind farms will experience damage to their yaw ring teeth during their service life. Typical causes include unpredictable wind events or uneven loads sustained over time.



The CNC machine is mounted onto the yaw ring and mills out the damaged area



The patented yaw ring repair consists of three steps: milling; cooling down; mount and fix

Replacing the yaw ring requires the entire nacelle to be detached using a crane and specialist labor – a process that is expensive for onshore turbines and perhaps uneconomic for offshore. Across the lifetime of a wind turbine, maintenance can represent up to a quarter of all costs incurred, and decisions such as choosing a cost-effective yaw ring repair versus replacement are set to become an important trend.

CO2 savings

The system developed by CNC Onsite can usually carry out yaw ring repairs within a few days. This not only reduces downtime, but results in significant CO2 savings too.

“We’re eliminating the need for manufacturing a new yaw ring and above all the huge logistical effort required to transport a yaw ring to the site, deploy cranes, which is particularly tricky offshore, and replace it,” Kellenberger said.

“Such an operation requires a significant number of people and a lot of equipment with all the associated CO2 emissions. With our repair method, this is no longer required,” he added.

“The fact that whenever you take down the nacelle there is a potential risk of damage to it and especially to the blades which is another factor that cannot be ignored,” Kellenberger concluded.

The yaw ring repair service offered by CNC Onsite has already been used on a range of turbines in wind parks, both offshore and onshore, since it entered the market in 2019 following many months of endurance tests, proving that the replaced teeth are robust over time.

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.

A long version of this press release is available, explaining the technical details behind the patented process.

Malene Conlong
Moller International
+49 171 6992650

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