

Dismantling and Rebuilding Wind Turbines

EURECUM RECYCLES ROTOR BLADES

Material Handler Cat MH3024 with a KEMROC KDS 50 Diamond Saw

In the years ahead, thousands of German wind turbines will need to be dismantled and many will be replaced with newer, better wind turbines. Recycling specialists EURECUM have developed a well proven process for pre- and post-shredding of rotor blades. The residual material can be reused at a high recycling level or it can be used as a fuel.

Thousands of wind turbines across Germany are close to reaching the end of their contractually stipulated service life. According to the Bundesverband Windenergie e.V. (Federal Association for Wind Energy), those affected by 1st January 2021 produced a total of 3,800 to 4,000 megawatts and by the end of 2025 the total power output will add up to around 16,000 megawatts. Turbines that cannot operate economically must be dismantled. Some first-generation wind turbines get an extended life by working in other countries. Technically obsolete turbines must be disposed of and this includes secondgeneration turbines that are so technically complex that rebuilding them is not a feasible option.

Many parts of a dismantled turbine are easy to recycle in a simple and very efficient manner, producing valuable recycled products. Concrete foundations and gravel from the substructure can be used in road construction; steel and other non-ferrous metals and electronic components are sorted according to type and recycled. To date, one of the biggest problems has been shredding and processing the huge rotor blades which are made from glass fibre reinforced plastic (GRP). Recycling specialists, EURECUM based in Lutherstadt Eisleben (Saxony-Anhalt), has recently developed a process for recycling them. The rotor blades are efficiently cut up on site, transported to a recycling centre and shredded into industrially valuable GRP granulate.

Fast, efficient cutting

The disposal procedure begins at the location of the disused wind turbine. A powerful material handler, like those used by recycling and demolition companies to handle material at their depots, is used to crush the dismantled rotor blades. In spring 2020, EURECUM took possession of a new Cat MH3024 (24-t) material handler supplied by Zeppelin Baumaschinen GmbH through their Erfurt branch. The material handler was delivered with



EURECUM uses a Cat MH3024 material handler with a KEMROC KDS 50 diamond saw to cut through wind turbine rotor blades.



The hydraulically driven diamond saw is used to cut the rotor blades into smaller sections.

an appropriately sized cutter attachment; a hydraulically driven KEMROC KDS 50 diamond saw (rated output power 135 kW) with a 1,200 mm diameter diamond cutting wheel. This attachment can also be fitted with a 1,000 mm diameter diamond cutting wheel. In extensive preliminary tests, this combination of carrier and attachment gave the optimal performance. The Zeppelin branch in Erfurt also determined the parameters such as rotation speed and cooling for the best results in terms of cutting speed, minimum noise and dust, and wear of the diamond wheel for the customer. EURECUM also purchased a fully hydraulic quick coupler on the dipper stick to achieve rapid changes between the KDS diamond saw attachment and a grab and keep the process time to a minimum.

The KDS range of diamond saws from KEMROC were designed to cut concrete, steel, reinforced concrete, natural stone, aluminium and they are particularly good at cutting glass fibre reinforced plastics as used for wind turbine rotor blades. High rotation speeds and a large selection of cutting wheels open a wide range of applications where these attachments can be extremely effective. In practice, in one day an operator with this combination of material handler and diamond saw can cut three 40 m long rotor blades of a typical 20 MW turbine, each weighing around 8 tons, in lengths suitable for transportation. Actual cutting time is around five hours. Jets spray water onto the diamond wheel trapping the dust which is collected in fleece mats placed under the rotor blade. The fleece mats are collected and disposed in the correct manner. "Composite material GRP is not inherently hazardous to the environment; it is also used in boat building for example," explained EURECUM Managing Director Alexander von Neuhoff, "but nevertheless, our method effectively prevents any dust from escaping into the environment."

Recycling at a high level

By cutting GRP rotor blades into three or four relatively large sections on site, the environmental impact of recycling is kept to a minimum. Using a material handler with grapple, the sections are loaded onto trucks with so-called walking floor trailers and transported to the nearest EURECUM processing plant or one of their partner recycling companies. At the EURECUM plant in Lutherstadt Eisleben, these sections are cut into sizes suitable for shredding in a twin-shaft shredder down to the size of sheets of paper. This material is then passed through a single-shaft knife rotor with secondary screening where it is reduced to a free-flowing material with grain size of 18mm. The next step is to separate out any iron and non-ferrous metals. The end product is a clean, fine-grained mixture of glass fibres and plastic. There is an existing demand for this material as a substitute fuel in the cement industry. There is also an increasing demand for this material at a higher level of recycling where it is used to produce recycled plastic parts.

Even before the EURECUM process was established, the recycling industry had ways to recycle rotor blades from wind turbines. However, according to the Managing Director at



The process developed by EURECUM has proven itself many times in practice. These sections of GRP are ready to be fed into the automated shredding machine.

EURECUM, the volumes were not there to develop a process on an industrial scale. This is no longer the case and a solution had to be found that could handle the growing number of de-commissioned rotor blades. "With our new recycling concept, which we offer throughout Germany," says von Neuhoff, "EURECUM can not only shred rotor blades in a highly efficient manner, but we can also produce material that can be reused which adds value to the recycled product. Our timing is perfect and with the planned shutdown or repowering of plants, we expect to be recycling between 2,000 to 3,000 tons per year." ■



At the end of the recycling process, the final product is a valuable, fine grained material that has a growing number of uses – for decking, as an example.

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