



VESTAS V47

CONTROLLER RETROFIT SOLUTION



VESTAS V47

Complete Solution powered by DEIF Wind Power Technology

Retrofit your Vestas V47 control system and extend the lifetime of your turbine. DEIF's retrofit solution for the V47 controller upgrade gives you access to more data to learn how your turbine performs. Our technology upgrade increases turbine availability and efficiency increasing the AEP per turbine.

State-of-the-art control technology

Upgrading the control system of your old turbine to DEIF's retrofit solution maximises the performance of your entire turbine.

Cost-effective, proven and tested technology specifically designed for the V47, DEIF delivers and integrates the retrofit solution. The upgrade is based on the latest technology in terms of controller hardware and control strategy and will increase performance, availability and efficiency of your turbine.

Training and support

As a vital part of the retrofit package we provide training and support before and after the turbine upgrade. With knowledge transfer and on-site training we will boost your competence and know-how to master the daily operation and maintenance of the turbine.

Retrofit or refurbish

DEIF retrofit solutions are suitable for on-site integration and for refurbishing old turbines to be re-installed at a new location, securing that they conform to the latest standards and local grid codes.

Benefits

A new control strategy and application software benefits all areas of the turbine for improvements. Optimising positioning and the surveillance of the turbine. DEIF's control strategy for retrofitting improves key functionalities of your V47, for instance: Intelligent monitoring, derating functionality and support for new sensors.

- ▶ 4 % increased AEP
- ▶ Maximise availability and efficiency
- ▶ Reduce service costs by removing the VRCC
- ▶ Lifetime extension with state-of-the-art control
- ▶ Full data access
- ▶ Up to 10 years warranty
- ▶ 20 years supply guarantee

With or without the VRCC – reduce costs and increase energy production

With DEIF's control solution for retrofit Vestas V47, your turbine can run with or without the VRCC. The purpose is to maintain turbine operation when the VRCC breaks down. VRCC breakdowns are the root cause of turbine downtime, resulting in loss of power production. DEIF's technology approach increases the number of production hours. By removing the VRCC, the power is limited to 600 kW, but with the new controller, you benefit from the control strategy improvements while increasing the AEP. This is predominantly possible in low and medium wind areas where the full load hours are very limited anyway.

Open partnership approach

DEIF Wind Power Technology is a strong partner through the entire retrofit process from design, integration, test and training to ensure our partners and customers' can take over the daily operation and maintenance with full understanding and competence. Wind sites are different and therefore require special adaption in order to optimise production and reduce downtime. The solution from DEIF is adaptable and can be adjusted to all parameters. With a fully open dataset, we deliver the necessary tools for site optimisation and self-performance.

Retrofitting for immediate profit

Our concept is that whenever there is a wind a wind turbine should produce power. Addressing one of the major pains in

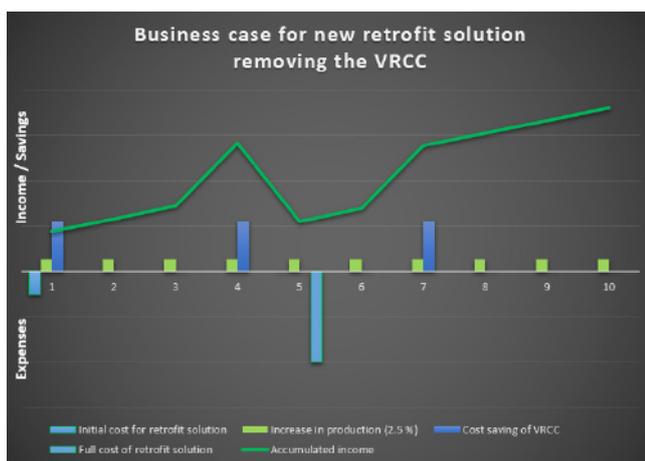
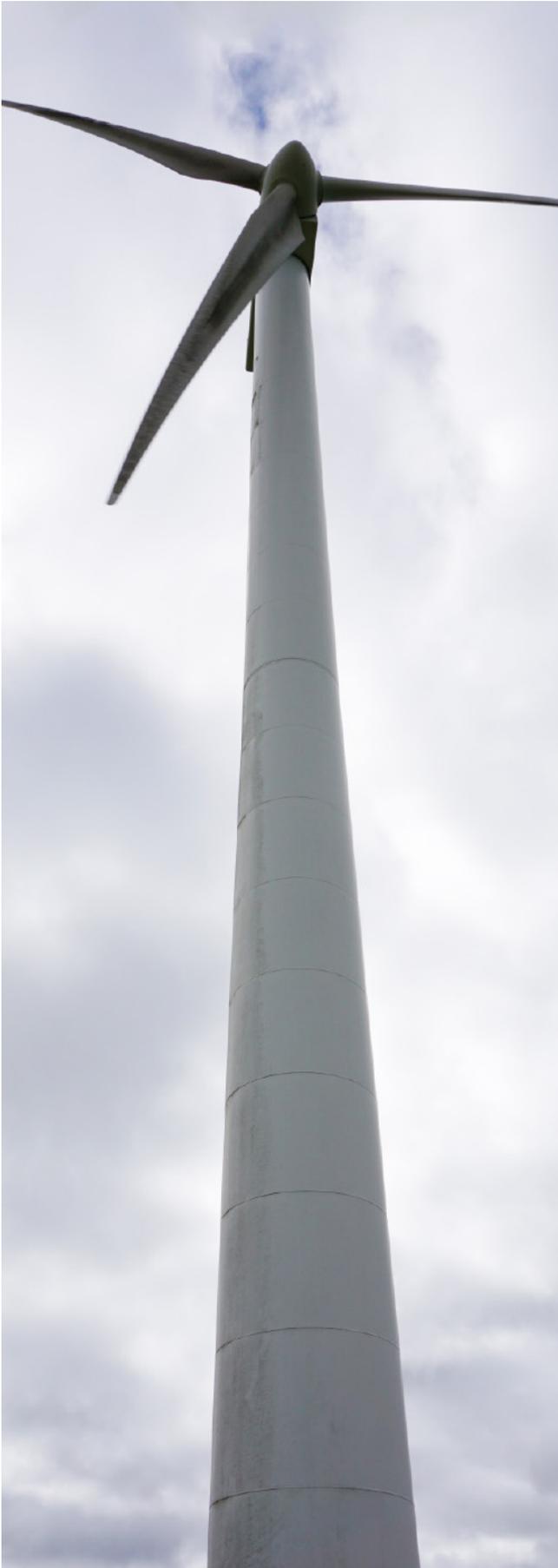


Figure 1 "On day one, the retrofit controller is installed with a 10% downpayment - less than the full cost of a repaired VRCC module. During the next 5 years, a positive income is generated due to increased production and all costs for continuous repair of VRCC components are eliminated. Over a period of 10 years of operation, the solution will increase AEP and reduce the cost of spare part significantly – totally reducing the CoE."

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the V47 fleet, the VRCC, we offer a solution that generates a profit from day one.

The concept is simple: When the VRCC is broken just retrofit the controller with our AWC 500 solution and benefit from increased production and no future spare part costs related to the VRCC.

With a financial support model, we are offering a five-year payment plan with a small downpayment on day one and after five years, the resulting increased power production and reduced repair costs will have covered the costs for the entire system.

How we increase AEP and extend life-time

We ensure optimum performance at any location and can increase the AEP by up to 4 %. In addition, we document how availability and efficiency has improved compared with the old control solution running at the same location.

With more than 15 years of experience in installing and upgrading wind turbine technology, we deliver a retrofit solution that increases AEP and extends the life-time of Vestas V47 turbines.

- ▶ Controller HW reliability
- ▶ Modern turbine control strategy and application
- ▶ Less stops due to intelligent yaw and cable twist
- ▶ Improved wind measurement
- ▶ Improved nacelle positioning – yaw alignment
- ▶ High wind ride through
- ▶ Intelligent temperature control
- ▶ Wind sector management
- ▶ Improved pitch at low/medium wind
- ▶ VRCC failure ride through

Measurement before and after retrofit

To ensure full transparency in performance, we can provide full measurement campaign on your turbine and compare performance before and after completion of the control retrofit as an added service to the retrofit package. We validate operational performance and compliance and ensure a full load validation for maximum safety in collaboration with certifying bodies.



DEIF A/S

Frisenborgvej 33, 7800 Skive, Denmark

Tel. +45 9614 9614

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