automation solutions

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Retrofit for Wind Energy

Increasing productivity and lifetime.

energy.industry.maritime.

Partner with the industry leader in Automation

Specializing in automation, control technology, and operations management of wind power plants, Bachmann excels in delivering a diverse suite of cutting edge automation technology, all with the common theme of open systems.

This has allowed customers spanning the globe and from multiple industries to realize a solution custom designed to fit the needs of their operations.

Controls Retrofit

Jump start new turbines or
breath new life into an aging fleet

In order for power suppliers to remain competitive in the wind industry, a balance has to be struck between the cost of maintaining their aging wind assets and the fleet's power production, with the ever looming question on the horizon, »at what point has a turbine reached the end of its remaining useful life?«

Previously, without a cost effective, minimal effort solution for continued operation, site owners were forced to repower (replacing older turbines with newer models) their fleet. With Bachmann's controls retrofit, the decision for wind site managers to shift their focus away from re-powering their fleet and towards the more cost effective controls retrofit solution has never been easier.

The Bachmann controls retrofit solution utilizes the existing turbine infrastructure and focuses on extending life, reducing loads and optimizing each turbine's performance, while meeting new regulatory compliance provisions and improving operation. The turbine's existing equipment, such as sensors and actuators, remains intact while the controller hardware and software are upgraded to latest model and controls algorithms. All controller upgrades and software adaptations are planned in advance and coordinated to allow implementation with only a few days of plant interruption.

Choose the controls retrofit that's right your turbines.

With no two turbines operating exactly alike and every wind site with different business models and micro-siting nuances, controls retrofits should be anything but a »one size fits all« solution. An effective retrofit takes into account not only the existing controls strategy for each turbine make/model, but also its unique failure modes and site requirements that are specific to the customer's operations strategy. With over 20 years of experience in turbine automation and turbine controls installed in over 90,000 turbines globally, Bachmann electronic is able to deliver unparalleled turbine retrofit solutions customized to meet the diverse needs of any customer and any turbine.

With the bases of the retrofit being constructed on a modular automation platform, plant operators are unlocking new potential from their turbines by introducing features such as scalability, compatibility, and open software to their fleet. Through Bachmann's retrofit solution, customers will extend the life of their turbines by up to 10 times, while experiencing greater availability and yield

Intelligent retrofit – multipronged approach

Bachmann takes into consideration not only software limitations within the original controls strategy, but mechanical limitations in the original design of the turbine while making improvements throughout. Fault-prone or obsolete components are replaced to ensure turbine reliability. Special care is taken to ensure the turbine will be technically fit to perform optimally for years to come. Each turbine retrofit is designed to reduce turbine load, extend life time of the turbine, increase safety, improve capacity and boost availability and production of the wind turbine.

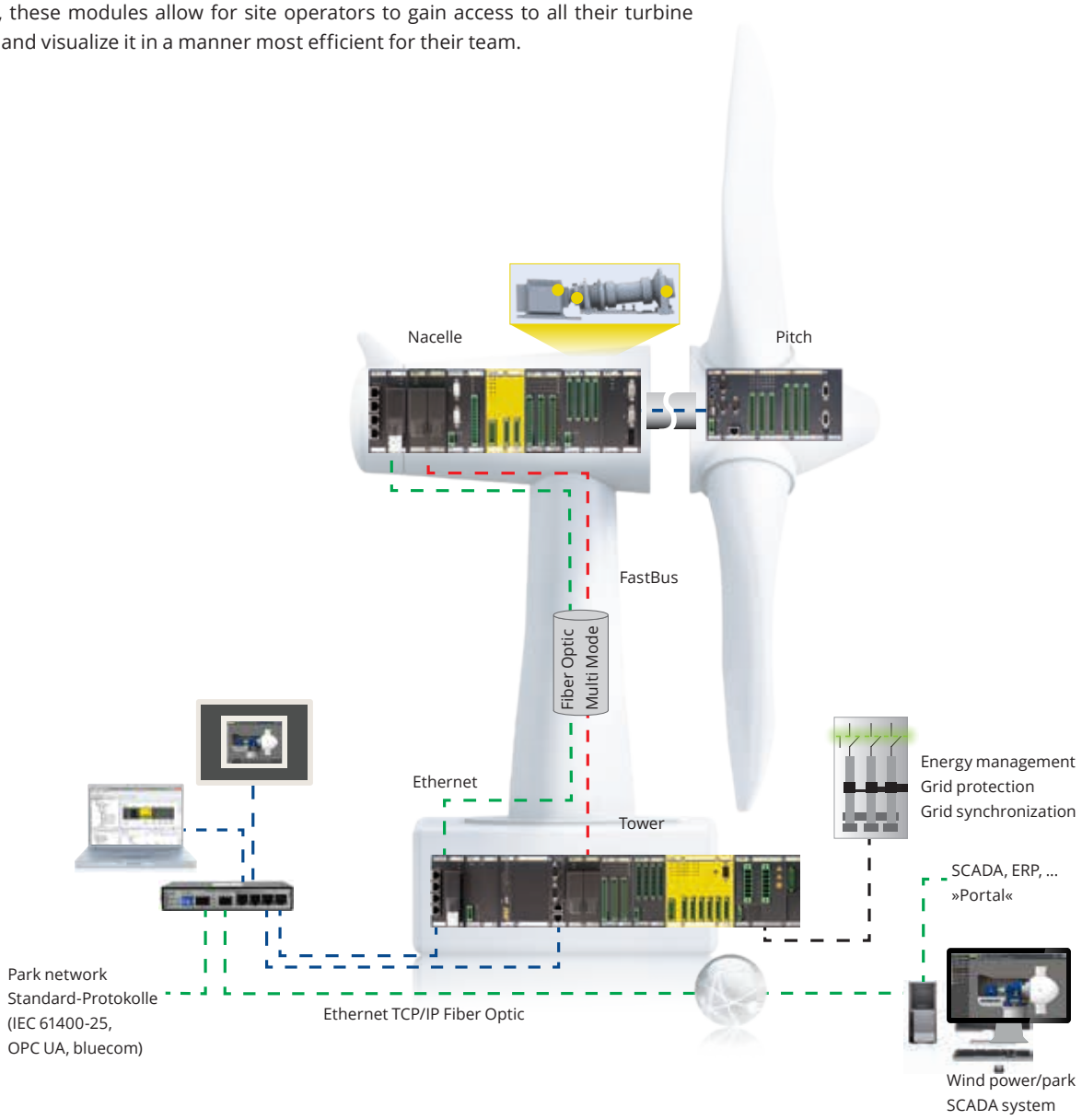
Systematic Bachmann Concept

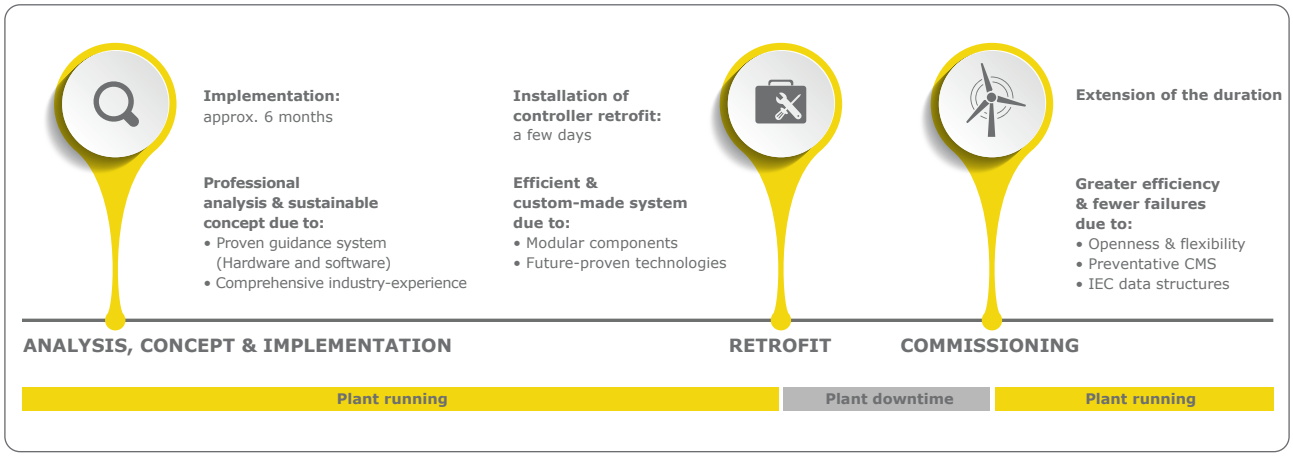
Your wind turbines at the forefront of the technology

Modular and scalable

The Bachmann retrofit solution with its modular and scalable design consists of predeveloped hardware and software for implementing basic turbine functionality, providing greatly reduced development effort for site specific customization.

Preprogrammed user configurable modules, defining visualization, networking, control, and diagnostics allow for flexible integration into any turbine. Additionally, these modules allow for site operators to gain access to all their turbine data and visualize it in a manner most efficient for their team.





With appropriate preparation the actual upgrade of the turbine with a new controller system requires only a few days on which the turbine is off grid.

Analyze → develop → implement → use: A systematic approach

A systematic approach to retrofitting turbines allows for quick roll-out with minimal downtime required for each upgrade, placing increased performance into the hands of site operators now. Detailed documentation for each step of the retrofit ensures not only quick and efficient installation, but quality work with repeatable results.

With detailed documentation of the technical data for the wind turbine, sensors, actuators, and load calculations, analysis is performed by Bachmann engineers in order to understand the optimal controls strategy. Utilization of existing hardware and cabling allows for the setup to be performed with not only minimal downtime, but at a reduced cost.

Implementation virtually without interruption

Bachmann calculates an average project runtime of approximately six months for analysis and conceptual design of the controller-side retrofit of a turbine. With appropriate preparation the actual upgrade of the turbine with a new controller system requires only a few days on which the turbine is off grid.

Using existing approvals

The approval factor also speaks for a retrofit. As a rule, the protracted and complex procedures are not required for a retrofit, because a new turbine is not involved. Thus in this regard a retrofit must be frequently preferred in situations where construction of a new wind turbine would trigger extensive approval procedures.

Independent data access

Access to the turbine data is required for a fundamental upgrade and retrofit. For example, if it is necessary to replace original components that are no longer available, then new controller parameters must be assigned for the replacement components. This is only possible through access to the software and parameter sets, which however the manufacturers do not always allow. It is not a rare situation for the entire wind turbine to be basically a black box to the outside; its data is only known to the manufacturer. This is a good reason to replace the entire control technology of the wind turbine with your own system. Through an open system, the operator then has access in future to all necessary data, independently of the manufacturer, and the operator can flexibly decide on adaptations and optimization.

ADVANTAGES OF RETROFITTING

- *Extend life of turbines*
- *Minimal investment for maximum yield*
- *Improved efficiency*
- *Short installation time*
- *Additional functionality*
- *Increase visibility into turbine performance with full access to all turbine data*
- *Customizable and scalable hardware and software*
- *Independence from the manufacturer*
- *Increase operational reliability*
- *Flexibility through a modular design*
- *Regulatory compliance*
- *Adaptability to micro-siting parameters*

Visualization, Networking, Monitoring

A proven hardware and software system

Bachmann solutions consist of proven hardware and software based on the M1 automation system, the central hardware element for control, monitoring, and networking of the turbines.

Central element for the control and networking of wind energy plants: The M1 automation system with WTT.

The software framework is based on Bachmann's proprietary WindTurbineTemplate (WTT), which includes the core structures and functionality for control of any wind turbines. Utilization of the WindTurbineTemplate provides developers with the framework to quickly configure new controls strategies or construct additional visualization tools for new turbines using Bachmann's predefined standard templates, saving on extensive development time.

Based on the IEC 61400-25 data structures, the template makes all turbine components (nacelle, rotor, converter, generator, etc.) available to the user. Moreover, functions for the data records, trends, wind rose, power curve, login, error handling, and alarm handling are already integrated. With the open design of structures in WTT, users can implement their own functions or modify existing functions at any time.

Increased functionality

Controller retrofits provide integration of new functionalities into older turbines that were previously not available. With the latest controller upgrades, Bachmann's integrated condition monitoring systems (CMS) are supported, providing sites with the full diagnostic coverage of their turbine drivetrain at reduced cost and minimal hardware. With a detection rate of over

99% for faults occurring across the drivetrain from the main bearing to the generator, Bachmann CMS sets the standard for machine diagnostics within the wind industry. With the integrated CMS solution recordings, analysis, and evaluation of the wind turbine status can be executed in parallel with the control program.

Utilizing Bachmann's Grid Monitoring solution, Grid measurement and monitoring capabilities can be added including:

- Current, Voltage, Frequency and Power Factor
- Active, reactive and apparent power
- Low voltage ride through
- Inadequate or excess voltage and current

Visualization, networking, monitoring

The »Wind Turbine Template« provides the user with a configurable turbine visualization as well as the OPC, UA/DA and IEC61400-25 interfaces for connecting to SCADA systems. Each M1 controller thus becomes the central server for permanently installed or mobile HMI devices.

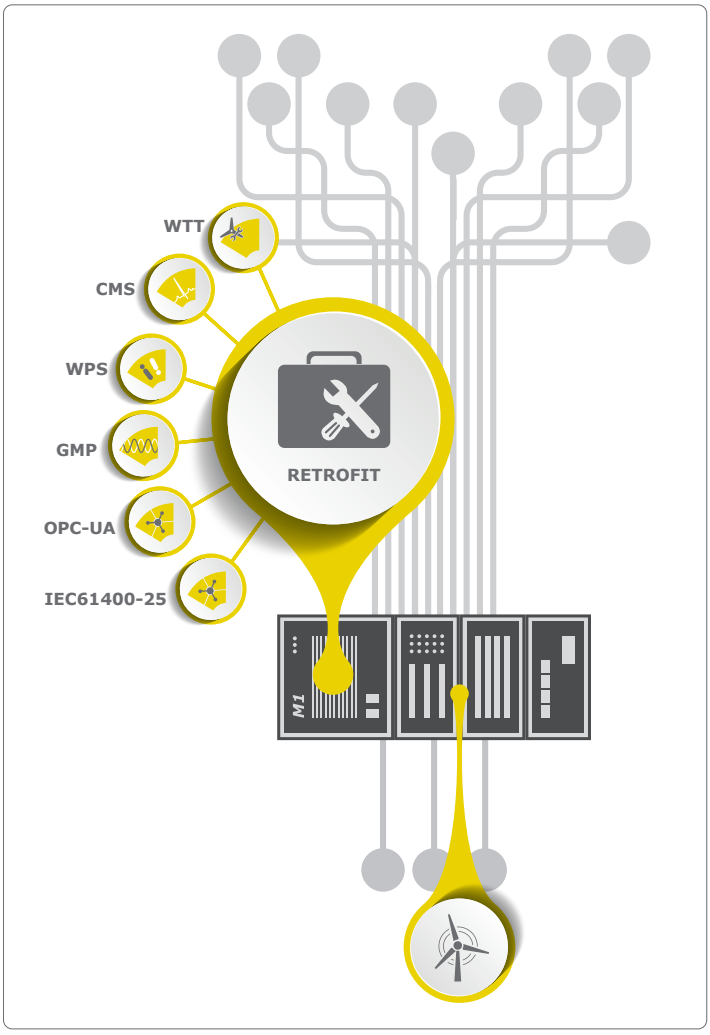
With »M1 webMI pro«, a powerful product for pure web visualization, Bachmann is also impressively demonstrating its technology leadership in this field: Any visualization devices such as smartphones but also powerful operating terminals can be connected.

With »Wind Power SCADA« (WPS), Bachmann is also offering a SCADA product based on IEC61400-25 data structures, which can be used for visualizing individual turbines right through to multiple wind farms in different regions. For retrofit solutions in particular, WPS supplements the system beyond the turbine: It offers standardized interfaces and a future-proof web-based technology.

Award-winning innovation

The retrofit controller solution was awarded the WEU O&M Excellence Award 2015 for the best technological innovation for wind energy plants. Specialists and leaders of the international wind industry awarded the prize for outstanding achievements in the operation and maintenance of wind turbines in conjunction with the Wind Energy Operations & Maintenance Summit USA.

Through a retrofit with modern technologies and innovative controller and monitoring systems, additional potential for increasing the yield of a wind turbine can be released.



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