QDA SOLUTIONS

WIND ENERGY COMPANY CREATES QUALITY SYNERGIES WORLDWIDE

Known as one of the largest wind energy companies worldwide, the company has over $16 billion in revenues and operates manufacturing plants in nine countries.

BUSINESS UNITS

Each of four subdivisions or "Product Business Units" is dedicated to the manufacture of a specific section of the wind turbine. There are aspects of quality management, such as data collection and component traceability, which affect all units. At the same time, each unit has unique quality needs.

Nacelle. The Nacelle consists of gears and bearings built around the main shaft which is driven by the blade assembly. Quality requirements here include the collection of torque data on all fasteners, SPC and traceability of components and materials.

Tower. The tower is the pillar, the base upon which the nacelle is mounted. It consists of tubes formed by welding together several plates, each of which has a unique shape. Primary quality concerns here are the collection and analysis of weld data, documentation of builds of material, and traceability.

Blade Assembly. Each turbine requires three blades made of carbon fiber and glass, ranging in various lengths. The main quality focus with blade assembly involves controlling the weight of the units and assessing the shape of leading and trailing edges. The cost of scrapping one of these units is considerable, so heading off defects is essential.

Control Systems. This is the hardware and software that controls the turbine. The emphasis here is on achieving first time part yield goals, supply chain management and tracing parts and errors.

STANDARDIZING DATA COLLECTION GLOBALLY

Given the size of their operations, the complexity of its quality challenges and the global dispersion of its manufacturing base, reconciling data and reports generated in different plants by production equipment sourced from a variety of vendors is a major challenge. Millions of measurements are collected and analyzed daily.

QDA is installed on the central server where it manages data collection, storage and distribution. The software standardizes quality data by ensuring that measurements are taken for the same critical characteristics in accordance with established rules and conditions, maintained in a uniform format, and subjected to the same analytical treatment. Consistent, disciplined quality practices start at the point of data collection, making sure all data is valid and meaningful before being imported and distributed. This guarantees comparability of all data from each plant and all machinery worldwide.

IMPLEMENTATION AND QUALITY INTEGRATION

The first step in introducing any new product or solution into the company is a successful pilot installation. Pilots for QDA data collection and SPC began in 2008 at the headquarters. There the software was set up to capture data from over 500 devices and databases, including in-house proprietary devices specifically designed for Controls and Blades, as well as welding machines, Zeiss CMMs, Leitz laser trackers and Shimoda test equipment. QDA is implemented in the complete product lifecycle chain, including planning and approvals of new developed parts and suppliers over the complete production chain with more than 5000 employees working in the system 24/7. No parts leave the production without being approved in QDA.
The company takes advantage of QDA's capabilities for use in:

- **Quality Planning** – APQP4wind including Process Flow, Control Plan, FMEA, PPAP and MSA.
- **Incoming Goods** – Management and approval of incoming goods including Inspection & Documentation directly integrated with ERP and WMS.
- **Data collection** – Inspection planning to illustrate characteristics, provide work instructions and support testing directly integrated with MES
- **Data Analysis & Reporting** – Visualize and part approval using automated analysis & reporting using advanced statistical methods directly integrated with KPI Reporting.
- **Non-Conformance** – Automated integration between data collection and error handling have reduced the time needed to manage the 8D process with significant savings and lower defect rates.

QDA Solutions and the company have worked together to roll QDA out at all plants worldwide from a centralized installation using Citrix.

THE ERP CONNECTION

QDA is integrated with and receives information from the company's SAP System. It automatically captures part data, supplier master data and incoming goods orders and returns receiving goods information back to the ERP system and warehouse management.

GLOBAL INTEGRATED QUALITY SYSTEM THAT IS BEGINNING TO REAP BIG RETURS.

THE MES CONNECTION

QDA is integrated with and receives information from the company's MES System. It automatically receives production orders and captured values from the MES system and returns relevant quality data to the MES system.

THE SYNERGIES

QDA ensures that all the quality data from planning a product until continuous improvement is managed in one integrated system that allows the company to gain synergies and reducing Cost of Quality significantly over the years. Collected data, whether from Design phase or during production is error-proof and valid from the point of origin. Having rock solid, known-good data at the point of data collections pays off up the line. By building an integrated quality management system, the company gets the most out of the data. In addition to applying Quality Data analyses, it can be sent along to suppliers and customers as documentation or as build certificates, and it also provides the backbone for quality planning, compliance and verification, complaint management and continuous improvement.

Automated analysis and notification functions applied all along the quality value chain provide for real time problem resolution. Advanced graphical reporting gets clearly presented and becomes the meaningful intelligence in front of the right eyes at the right time.

CUSTOMER FOCUS

The company's success hinges on successful turbine installation and operation on the part of its customers. The company takes an active consultative role, working with clients to develop their unique requirements and lending its expertise throughout the planning phase. The QDA-based quality system is a critical part of the process, operating in COP (customer-oriented production) mode. The software applies demand-driven production
set-ups for quality control at each process step, defines strict and concise tack times, applies SPC with six-sigma targets, establishes employee certification processes and standardizes equipment and tool management.

CUSTOMIZED ANALYSIS

QDA Solutions developed an automated work instruction whereby QDA assesses whether the production line is within the quality specs and targeted sigma level. It analyzes the output of certain operations to determine if they are performing at an optimal level, or whether the testing and data collection processes, which are very time sensitive, need to be adjusted.
Another customized module was created by which QDA automatically releases test certificates and produces test reports using the build in QDA Report Designer.

NACELLE ASSEMBLY

The entire nacelle assembly routine is organized within a single QDA check plan, with each step being defined as a process. The check plan, which contains "order" fields and information about the sample, requires that each step be formally accepted as verification that it has been successfully completed. It also ensures that each component is traceable. These inspection plans contain up to 450 processes and cover several hundred characteristics.

QDA retains all assembly information, providing a database from which all relevant documentation and work instructions can be updated. Previously all checks were performed manually. Documentation was created with pen and paper.

After a nacelle is assembled, including connection of all the cables, collected data is imported into QDA using the import manager. When QDA determines that the test results are positive and the assembly "passes", it summarizes the findings in the appropriate reports and automatically generates and distributes an acceptance certificate. Quality Management and KPI Reporting QDA also manages data that feeds Key Performance Indicators. Reliability expectations of wind turbines demand that 100% of blades, nacelles and other components be tested. The process generates millions of records, and QDA logs the test results, identifies errors, tracks rework and calculates the values that go into KPIs which provide meaningful comparisons. First Pass Yield is tracked, measured and reported as well. It's a metric that indicates the percentage of items moving through a process with no problems on the very first pass.

With QDA at the nucleus of the company's quality management platform, the company has rolled out what all leading manufacturers are trying to achieve – an exemplary integrated quality system that improves quality continually on several planes, reduces costs on a grand scale and ensures product performance worldwide.

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