



New technology for generating energy



Senvion's production hall

It is hard not to notice the progress made in the transition to renewable energy use. According to German government figures, in the first six months of 2015 there was more electricity produced from renewable sources than ever before, and wind power will clearly play a central role in the energy mix of the future. This was amply demonstrated by the Production and Technical Innovations excursion organised by HUSUM Wind 2015 in cooperation with windcomm, the Schleswig-Holstein network agency. The 34 participants were given insights into the production processes of the MM-series onshore turbines at Senvion Deutschland GmbH, and the innovations at Windtestfeld Nord.

The excursion started with a talk by the Schleswig-Holstein wind industry cluster, which emphasised the pioneering role of Germany's northernmost state. There are already 2,000 wind industry businesses based in Schleswig-Holstein ranging from development and planning to the manufacturing, erection and operation of wind turbines. More than 9,000 jobs, 3,000 in the Husum region

alone, are dependent on the wind industry. A highlight of the excursion was the visit to the Senvion Deutschland GmbH production facility in Husum. This is where the nacelles for the MM-series 2MW onshore wind turbines are built. 'A nacelle leaves our premises every day. In just ten shifts we assemble the components to create a finished nacelle, which

can then be shipped to England or Sweden straight from our own wharf,' explained Olaf Schley, head of production at Senvion GmbH. 'Since our founding in 2001 we have developed from a traditional shipyard to a high-tech wind turbine manufacturer.'

Senvion has over 25 years of experience in building wind turbines, and has already installed over 6,000 onshore and offshore turbines worldwide. Senvion's turbines can also be adapted for very different climate zones and wind classes. The company's Permanent Monitoring Service also offers an all-round, no-worry package, and a guaranteed turbine service life of at least 15 years.

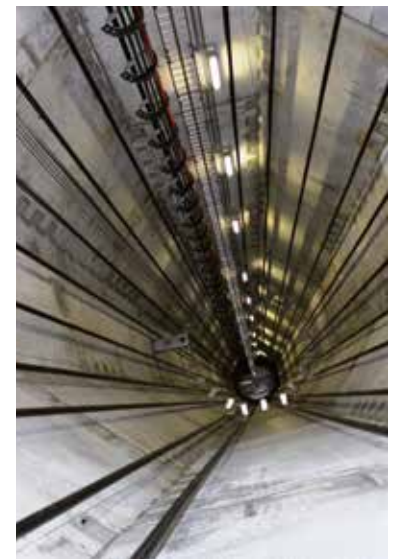
Increased use of wind energy as a serious alternative to fossil energy sources only really took off in the 1980s, and there is still plenty of room for technical innovations in this yet young industry. There is also an increased demand for prototype test fields, with the wind-rich North Frisia region offering ideal test conditions for research and development. The excursion visited Windtestfeld Nord GmbH, which was founded by a consortium of municipal institutions and the Flensburg University of Applied Sciences and regional enterprises in Südermarsch, just south of Husum, in 2013.

The excursion also took in the first SkyWind prototype, erected in March 2015. This prototype, developed by SkyWind GmbH, is part of the company's optimisation and simplification strategy for developing cheaper

and more effective wind turbines with a service life of more than 20 years. Future service and maintenance should also be made easier.

'Our concept is really simple; we use components which are easy to transport, install and change. The tower is made of cement components and has a lifting system on the top, which makes installation possible even in regions where access for huge cranes is not possible. The rotor has also just two blades, which makes it easier to install and service,' said Frank Richert, managing director of SkyWind GmbH. He added: 'Innovations mostly come from small companies. And we also offer a test bench for those suppliers who want to bring their own innovations to the market.'

Simone Buser



Inside a SkyWind cement tower



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Wind measurement at the spinner: higher yield, better insights

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With the patented iSpin system, wind conditions can be measured more accurately than ever before, resulting in higher yield, better insights and lower loads. To achieve this, iSpin uses proven ultrasonic technology and measures the wind where it first hits the wind turbine: directly at the spinner, in front of the rotor. Conventional wind measurement at the nacelle behind the rotor can be inaccurate due to turbulence. The iSpin sensors, intended for permanent installation, measure and monitor the power curve in accordance with IEC 61400, as well as yaw misalignment, turbulence intensity and flow inclination. To enable as many operators as possible to benefit from accurate measurement data, we are offering the iSpin system for a fixed monthly fee. The best thing is that the additional yield, which can be generated by correcting yaw misalignment, can more than cover the service fee.

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Visit us in hall 3, booth 3B08

iSpin measures and monitors:

- Power curve
- Yaw misalignment
- Turbulence intensity
- Flow inclination



Retrofit – market of the future

Retrofit is often confused with refurbishment, but they are two different things. With refurbishment the turbine is completely renewed. With retrofit the controlling system is replaced. Every modern wind turbine uses and produces data, and data is crucial today. In smart grids wind turbines have

to deal with SCADA systems that control and balance the local (smart) grid. Information technology is rapidly changing over time. If a wind turbine is 20 years old, it has the technology of a Commodore 64 computer. Retrofit is like replacing this technology with a modern laptop.

Because of the rapid change in information technology, all wind turbines are likely to need to be retrofitted in time. There are a number of exhibitors at HUSUM Wind who deal with retrofitting, and we mention a few below:



MITA's retrofit system model at the booth



Wind World 750 before



Wind World 750 after

MITA (booth 1A04) has a retrofit solution for nearly all manufacturers (e.g. Senvion, Vestas, Siemens) and can perform a retrofit in one full day.

SPICA (booth 3B18D) specialises in retrofitting and acts as a trouble-shooter in failures with control systems in general. Safety remains an issue. One has to prove that the turbine runs under the same conditions as before. Denmark has its rebuild certification, but certification after retrofitting is different from country to country.

Pontis Engineering (booth 2E25) bridges the gap between design and manufacturing. The retrofit market is a market of small series and flexible working processes. Pontis is specialised in integrated, one-stop-shop engineering solutions for the development of advanced composite products.

Frits Ogg, Renewable Energy Consultant

Bridging design and manufacturing
Specialist in development of advanced composite products

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Retrofit

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Congress programme Thursday 17 September 2015

Time	Auditorium	Room 6	Room 2	Room 1	Room 3	Room 4	Room 5
10:30–11:15	Turkish Wind Energy Association  tba.	Pressekonferenz des Bundesministerium für Wirtschaft	D29  DNV GL „De hett noch wat to loopen“ – Eine Anleitung zum alt werden. DNV GL zur Zertifizierung von Wartungsdienstleistern & Möglichkeiten zur Laufzeitverlängerung Let them keep on running – an instruction for turbines past their prime	Geschlossene Veranstaltung Closed Event		D32  CUBE Engineering Vom Ertragsgutachten zum Erlösgutachten – Vermarktung von Windenergie From yield reports to revenue reports – Commercial value of wind energy	D37  Siemens AG a) Produktportfolio Siemens Wind Power b) Elektromagnetische Verträglichkeit a) Productporfolio Siemens Wind Power b) Electromagnetic compatibility
11:30–12:15					D29  DNV GL Due Diligence „Light“	D33  Michalski · Hüttermann & Partner Patentanwälte mbB Patentstrategien im Windenergie-Business Patent Strategies in the Wind Energy Business	
12:30–13:15							Geschlossene Veranstaltung Closed Event
13:30–14:15					D30  or  (depends on the participants) ABB Switzerland Ltd Einfluss des Windumrichterdesigns auf Projektrisiken und Wirtschaftlichkeit eines Windparks How the wind turbine converter design can mitigate project risks and increase wind farm output	D34  RSM Germany EEG 2014 & Co. – So geht Windkraft wirtschaftlich – Basics für Einsteiger und Specials für Fortgeschrittene. The economy of wind energy – basics for beginners and news for advanced experts	
14:30–15:15		D26  Primo Marine Clever Cable Care für die gesamte Lebensdauer des Kabels A lifetime of clever cable care	D27  iTerra Wind GmbH & Co. KG a) EisMan/EisMan b) Ausschreibung/Tendering c) Planung/Planning	D32  natGAS Intelligentes Direktvermarktungskonzept: mehr als nur Zusatzerlöse natGAS Intelligent Direct Marketing Concept: More than just additional revenues	D31  or  Techimp HQ S.R.L. Prüfung und Überwachung von elektrischen Betriebsmitteln in Windkraftanlagen Testing and Monitoring of Electrical Components in Windfarms	D35  Bosch Rexroth Dynamische Lastreduzierung und Ertragssteigerung von Windenergieanlagen Dynamic Load Reduction and Energy Yield Optimization for Wind Turbines	D38  GE Wind Energy GmbH Die neuen leistungseffizienten Anlagen und Serviceangebote von GE Wind für den deutschen Markt GE's new performance-optimized systems and services for the German market
15:30–16:15			D28  Rechtsanwaltskanzlei von Bredow, Valentin, Herz Rechtliche Risiken von Ausschreibung in der Projektentwicklung und Möglichkeiten, diesen Risiken im Rahmen der Vertragsgestaltung zu begegnen	D29  AMSOIL Inc. Erweitern der Getriebelebensdauer – Auswertung der Verschleißrate von Getriebeölen für Windkraftanlagen Extend gearbox life time – Wear Rate evaluation of Wind Turbine Gear oil Brands	D32  ENERCON GmbH Neue Konzepte und Technologien – dezentrale Energiewende am Beispiel Baden-Württembergs New concepts and technologies – decentralised energy transition using the example Baden-Wuerttemberg	D36  RES Deutschland GmbH a) Chancen & Risiken von Ausschreibungsmo- dellen – Internationale Erfahrungen b) Speicher in der Windenergie – Technologieentwicklung, Kosten und Einsatzpotentiale a) Opportunities & Risks with Tendering Models – International Experiences b) Storage of Wind Energy - Technological Developments, Costs and Application Potential	
16:30–17:15							
17:30–18:15			D28  WIV GmbH a) Digitale Revolution im Vertrieb – Online neue Kunden gewinnen b) In Google nach vorne – so funktioniert's! a) Sales 2.0 – utilizing the internet as a distribution channel b) Your way up in Google – this is how it works!				



The future of technology - Power plant control

There is an emerging need to operate wind parks similar to conventional power plants, so technologies which enable this capability as part of a power plant control (PPC) system will be favoured in the coming years. Certainly, the Internet of Things (IoT) will play an important role as an underlying platform on which the performance and price optimisation of the wind park will be evaluated and achieved.



SCADA control center of the offshore wind farm BARD Offshore 1

Overall the design intent of the future PPC system is to increase annual energy production (AEP) and regulate wind turbine/wind park power output based upon demand and electricity price optimisation. The architecture of the PPC system of the future will deliver maximum output of price-optimised electricity while maintaining overall health of each turbine in the wind park.

Predictions for the PPC system of the future include:

- Forward-looking turbine and/or wind park operational envelope definition based on component life consumption models. This multi-variable analysis approach enables robust operational control by IoT when one turbine can overproduce to make up for another turbine underproducing so that output power is stabilised.
- Model-predictive controls to enable maintenance scheduling and price-optimised downtime assessments.

- Derate or uprate control for availability maximisation versus power output optimisation is likely to become an emerging aspect of this technology. Component stress reduction with AEP loss minimised as well as derating for component life preservation and scheduled maintenance targeting will be key.
- Electricity price optimisation will also involve uprate (or the avoidance of derating) in anticipation of peak power pricing and derating/curtailing during off-peak power pricing to preserve turbine component health.
- Energy storage integration for price optimisation will also be possible. Turbine derating for component life preservation combined with release of stored energy would allow power output to stay above a threshold level while turbine health is maintained.

Several key technologies which are already deployed in the wind industry will require system engineering and integration in order to enable these capabilities in the future PPC system:

- Component damage accumulation monitoring including 'real-time' stress accumulation monitoring of critical drive-train, blade and electrical systems components. Using the IoT platform, turbine data from multiple units will be communicated and analysed to optimise individual turbine performance in parallel to the aggregate wind park performance.
- Component damage accumulation data will need to be fed into models of the turbine control and wind farm control system to predict component life consumption, life consumption rate and remaining useful life.
- Controls which optimise turbine and wind park performance based upon these predictive models will enable component-life-optimised and price-optimised control of individual turbines and the wind park.

The challenge for successful utilisation of IoT as an enabler to PPC systems necessitates accurate data acquisition, analysis and implementation of control solutions based upon data gathered from IoT platforms. Ultimately this future PPC system will require a system engineered approach, so designers will need to think more holistically than in the past.

Philip Totaro, Founder & CEO, Totaro & Associates

Worldwide wind market booming like never before

The worldwide wind capacity reached 392,927MW by the end of June 2015, out of which 21,678MW were added in the first six months of 2015. This increase is substantially higher than in the first half of 2014 and 2013, when 17.6GW and 13.9GW respectively were added. All wind turbines installed worldwide by mid-2015 can generate 4 per cent of the world's electricity demand. The global wind capacity grew by 5.8 per cent within six months (after 5.6 per cent in the same period in 2014 and 4.9 per cent in 2013) and by 16.8 per cent on an annual basis (mid-2015 compared with mid-2014). In comparison, the annual growth rate in 2014 was lower (16.5 per cent). Reasons for the relatively positive development of the worldwide wind markets are the economic advantages of wind power and its increasing competitiveness, uncertainties regarding the international oil and gas supply, and the pressing need to go for emission-free technologies in order to mitigate climate change and air pollution. The world market for wind power is booming like never before, and the World Wind Energy Association (WWEA) expects new record installations for the total year 2015. The main markets are still China, with an astonishing growth of more than 10GW within six months, the USA, Germany and India. Brazil showed the highest growth rate of all major markets; the country has increased its wind power capacity by 14 per cent since the beginning of this year. However, several of the European markets are now very flat, and also the largest European market, Germany, expects a major slowdown in the next one to two years, after the expected regulatory changes are in force.



Major markets – growth rates in the first half of 2015

News

SgurrEnergy completes construction monitoring on Borkum

The renewable energy consultancy SgurrEnergy acted as technical advisor on behalf of the project lenders during the financing and construction monitoring phases of the 200MW Borkum wind farm. The project, located



SgurrEnergy completes its construction monitoring role for Borkum

ed approximately 45km to the north of the East Frisian German island of Borkum, consists of 40 wind turbines and will have the capacity to supply the electricity of approximately 200,000 households. Borkum, the first municipally owned offshore wind farm in Europe, was officially opened by the developer Trianel GmbH at the end of August.

Booth 5A04B

Nordex unveils a turbine tailor-made for light-wind German regions

At HUSUM Wind 2015 Nordex SE is presenting the light-wind N131/3300 turbine, which it has developed specifically for the German market. The N131/3300 is a new version of the N131/3000 from the Generation Delta range. With a rotor diameter of 131 metres and a nominal output 10 per cent higher than that of the N131/3000, it can boost yields by between 4 and 6 per cent depending on the location. The N131/3300 has a guaranteed noise emission level of a low 104.5dB(A) – even in yield-optimised operations without the use of any acoustic assistance. The light-wind N131/3000 turbine is currently undergoing field testing. Preliminary results from sound emission testing confirm the forecast figures: at 103.1dB (A) the turbine even remains below the guaranteed maximum level of 104.5dB (A). The N131/3300 can already be included in applications for permits for 2016.

Booth 1B11

Lösomat presents the new screwdriver Lösomat-Heavy-Duty LHD-80

The new screwdriver Lösomat-Heavy-Duty LHD-80 is able to reach an engine speed of 13 revolutions per minute (rpm). The maximum torque is not reached until 8,000Nm. This engine will enable companies to increase productivity.

Booth 2E28

Mita-Teknik receives SDL certification

Mita-Teknik has received the official SDL certificate for the MD70/77, FL70/77 and S70/77 platforms, using the WP3100 MK II controller. In close cooperation with partners SeebaWind and GE Power & Water, Mita-Teknik secured the SDL certificate from the German accreditation agency M.O.E. The certification means that the company's WP3100 MK II Retrofit solution for the MD70 (1.5MW) turbine platform complies with the regulatory requirements for the SDL bonus scheme. The SDL scheme allows owners € 0.7 cent more per kilowatt-hour until 2020, if they meet the requirements before the end of 2015.

Booth 1A04

New RePLANT pro-management solution

ITS is presenting its new management software for renewable power plants at HUSUM Wind 2015. RePLANT is a solution for universal and integrated management of wind power, solar and other renewables. It comes with a new user interface for large screens, multi-monitor use and mobile access and has multi-language capabilities. RePLANT is designed for larger and mixed portfolios of renewable power plants with direct access to real-time process data.

Booth 3A25

Siemens focuses on cutting costs

This year at HUSUM Wind Siemens is focusing primarily on cost-cutting and digitalisation across the entire wind power value chain. The company's latest products and developments include the Model SWT-3.3-130 wind tur-

bine, currently undergoing trial testing, which is set to deliver efficient rates of energy production for sites offering low and medium wind speeds by 2017. Other products featured include load management systems and energy storage – battery storage systems as well as electrolysis systems – which are aimed at lowering future costs of distributing and integrating wind power into the grids, and the multi-level Wind SCADA System, which is suited for wind turbine manufacturers as well as for independent service-providers. Siemens will also be presenting its busbar trunking systems and transformers as well as medium- and low-voltage switchgear equipment specially designed for use in wind farms to ensure safe, reliable and efficient power distribution and feed into the grid.

Booth 2A10

Leine Linde Systems presents a generator slip-ring

Leine Linde Systems is presenting its new generator slip-ring (GSR) at HUSUM Wind 2015. The newly developed GSR provides a rotor slip-ring replacement for double-fed asynchronous generators brands such as ABB, Weier and Leroy Somer in the power range of 850kW to 3MW. The GSR has a universal hole pattern and can thus be used in many generators. Such generators are typically often mounted in Vestas wind turbines of type V52-V90. The GSR has undergone a successful one year field test and is now officially available.

Booth 4D04



Generator slip-ring

Plarad introduces its latest nutrunner – the DE1

In Plarad's new generation nutrunner, the DE1, the speed of the tool is directly controlled by monitoring the electrical current delivered to the tool. By monitoring the current fluctuations and the temperature of the unit it is possible to provide accuracy of applied torque. The DE1 makes use of the electro-mechanical design experience of Plarad's nutrunners – and the user interface and display screen have been comprehensively considered within the design process, resulting in a robust tool which is easy to use and packed with new features.

Booth 1E23



Electric nutrunner DE1

Complex wind shear

The UK's Met Office is launching a white paper at HUSUM Wind that calls for industry collaboration to minimise impacts of complex wind shear on renewable energy production. Further research could optimise energy yield predictions, reduce charges, improve downtime planning and give a better understanding of when to replace turbines. This new investigation by the Met Office reveals that the wind energy industry lacks an in-depth understanding of complex wind shear and the white paper calls for future collaboration to aid in mitigating its ill-effects on an already stressed sector.

Booth 5A14

Meet the Expert Lunch: Let them keep on running – an instruction for turbines past their prime

On Thursday 17 September DNV GL is offering a lunch seminar where you can find out more about opportunities for turbine maintenance and lifetime extension. The seminar, which will start



at 10:30 in Husum Conference Room 2, will provide an opportunity to meet DNV GL's experts over a typical north-German lunch and learn by means of practical examples how to optimise your wind farm maintenance operations.

Booth 1E28

15 years of Deutsche WindGuard

Wind energy consultant Deutsche WindGuard celebrated its 15th anniversary on Wednesday afternoon at HUSUM Wind. CEOs Gerhard Gerdes, Dr Knud Rehfeldt and Axel Albers founded the company in 2000 as one of the first independent consultant companies with a comprehensive portfolio covering the whole life cycle of wind energy projects.

Booth 2C15

seebaWIND Service presents new optimisation concepts

The manufacturer-independent service provider seebaWIND Service is presenting new optimisation concepts at the trade fair HUSUM Wind 2015. Among other retrofits, seebaWIND will present optimised rotor blades and a new Mita control system. seebaWIND will host a press event focusing on the optimisation concepts on 16 September at 11:00.

Booth 0F09



seebaWIND's technicians on duty

Senvion erects its 2,000th onshore wind turbine

Senvion's 2,000th turbine, a 3.4M114 NES, forms part of the Behrendorf wind farm in Schleswig-Holstein – 15 kilometres northeast of Husum. Together, the 2,000 turbines generate over 2,565,000kW per year on average – enough power to supply all 2.5 million



Onshore wind turbine

private households in the whole of Schleswig-Holstein, Mecklenburg-Western Pomerania and Bremen with renewable energy.

Booth 1C07

Meet the Expert Lunch: Due Diligence 'Light'

Wind projects in advanced regions where stakeholders have several years of experience often require a less detailed due diligence than in emerging markets. This seminar addresses the specific due diligence needs that are required in developed markets and provides an opportunity to talk to DNV GL experts about a tailored approach for wind projects in Germany. Going beyond due diligence topics, the seminar will also address challenges related to energy assessment reviews and what to consider when financing a wind

farm or wind farm investments in Germany, including requirements from lenders' and technical advisors. The lunch/seminar will take place from 11:45 to 13:15 on 17 September in Husum Conference Room 3.

Booth 1E28

Nordex inaugurates wind farm in northern France

Nordex has officially opened a wind farm developed in-house in France, the 75MW 'Seine River Gauche Nord' ('SRN'). Together with H2air Nordex has set up the wind farm on a turnkey basis for the investor KGAL Investment Management. By 2020 the share of renewables in the French power supply is expected to increase to 23 per cent and by 2030 to as much as 32 per cent. In addition to civil engineering and connection to the grid including a private substation, the work also involved obtaining approvals, which in this case meant coordinating with the French military. 'SRN' is located in the north of France in the département of Aube, near the military radar station of Prunay-Belleville. The project partners have installed the 30 N100/2500 turbines in a special version designed so as not to interfere with operation of the radar station.

Booth 1B11

Wilmers Messtechnik shows new measurement devices

Wilmers Messtechnik is exhibiting its new measurement devices at HUSUM Wind. They provide reliable data transmission via a LTE modem, precise temperature gradient measurements and monitoring of wind measurements via a blueberry site monitor.

Booth 5C02

HUSUM Daily 2015

During the four days Windtech International will publish the HUSUM Daily. The HUSUM Daily will be prepared and edited by a team from Windtech International in cooperation with staff from HUSUM Wind. Each day we will work on the issue to be published the following morning. If you have editorial material you want considered for publication please make sure that we have it before 1 pm each day.

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See the IPMS for yourself in Hall 4/D04 at **HUSUM Wind 2015** from September 15 to 18, 2015

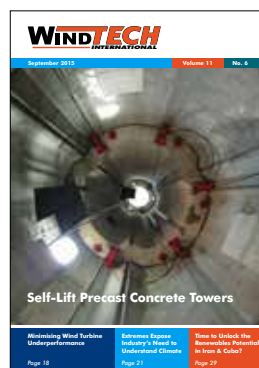
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