

Issue 01 | 2018



IMPULSE

Wind energy

Generators for a new
offshore wind farm
in the North Sea

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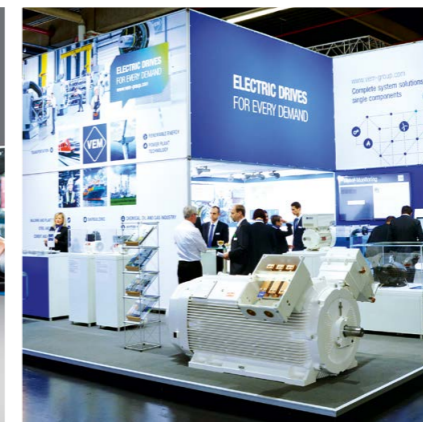
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SLIP RING MOTORS OF THE NEXT GENERATION

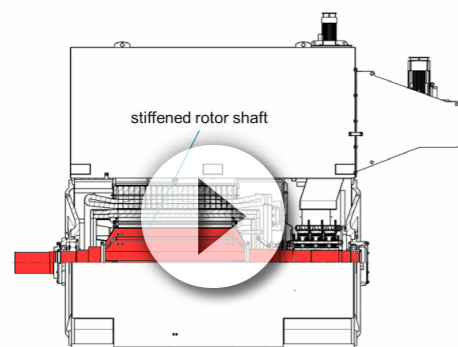
Customers in the cement and mining industries can now look forward to proven VEM asynchronous motors with decisively improved features and in new design.

Wherever you look in the cement and mining industries – whether at the mills, crushers, kilns, fans or conveyors – the electric drives are subject to dust, heat and extreme mechanical stresses. Given the difficult starting conditions, and also the fact that installations are often to be found in areas with relatively underdeveloped power supply networks, an asynchronous motor with slip ring rotor is the perfect choice.

VEM has been one of the prominent suppliers of drives to the branch for many years, and motors with outputs up to 15 MW are in use in countless cement works, open-cast mines, processing plants and similar industrial applications around the globe.

We are furthermore in constant dialogue with the customers to gather feedback on their user experience, for example information on unexpected external influences on the motors. Such customer feedback has already fuelled many years of further development by our technologists and engineers. Step by step, these design improvements have now been implemented in our asynchronous slip ring motors. Individual changes have concerned the slip rings and end shields, as well as the shafts, winding heads and bearings. Together, they form the basis for even greater resistance to external influences and thus to higher overall availability. Optimised cooling, new insulation materials and the implementation of new methods for electromagnetic calculations have enabled performance to be increased by up to 26 %. VEM asynchronous slip ring motors with and without brush-lifting device, in 4- to 16-pole versions, cover outputs from 250 to 15 000 kW across the voltage range from 600 V to 13.8 kV.

The current products can quite rightly be referred to as slip ring motors of the next generation. They stand abreast of the international state of the art, and perhaps even define that state of the art. The following animation spotlights a few components which demonstrate the new quality introduced into drive design and manufacture by VEM.

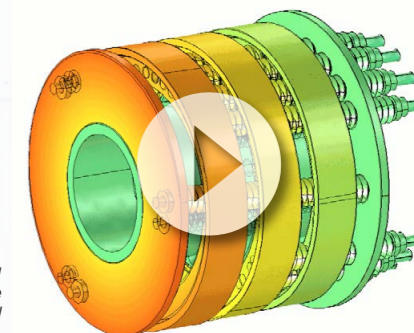


Many benefits thanks to numerous innovations

One of the innovations which now benefit our customers is a new reinforced end shield, which increases the rigidity and thus reduces vibration. The strengthening of the shaft is another point to be mentioned. Thanks to their now higher critical speed, our slip ring motors are suitable for use on problematically executed foundations. Adapted radial cooling slots achieve better cooling of the machine. Outputs which previously required selection of a motor in size 1 000, for example, are now already attainable with size 800. An overview of the many improvements is provided by the article on the next page.

Complex calculation

To be able to raise a long-proven asynchronous slip ring motor to the next level in terms of both its housing and internal features, it is necessary to apply special calculation methods which permit the analysis of complex correlations. Our method of choice for mechanical analysis was the finite-element method FEM (see animation below). Here, a multitude of parameter variations served to determine a compromise between the individual aspects of thermal, electromagnetic and mechanical behaviour.



Twisting of a slip ring visualised using the finite-element method

Motor retrofits and subsynchronous converter cascades (SCC)

When developing the new generation of slip ring motors, our designers were mindful of the diversity of older machines still operated by our customers. Accordingly, the motor design improvements have been realised such that individual machine components can be replaced, and thus older machines can be retrofitted. With this retrofit variant, we offer our customers an upgrade by which even older machines can be treated to the latest scientific findings.

In addition, slip ring motors can be expanded into a subsynchronous converter cascade. The benefit: Through the cascaded connection of uncontrolled and controlled power converters in the rotor circuit of a three-phase asynchronous motor, the slip power can be recovered and fed back to the supply grid. This means that even motors which are not in themselves suitable for converter-fed use can be operated with speed control in the range from 50 % to 98 % of nominal speed.

We would be pleased to answer any questions you may have about the new generation of slip ring motors, retrofit options and SCC solutions. Simply send us an e-mail to high-voltage@vem-group.com.



UP TO 26 PER CENT MORE OUTPUT FROM THE SAME MOTOR SIZE

Numerous innovations and further developments reduce the susceptibility of VEM motors for use in the cement and mining industries and help to guarantee reliable operation. Here is an overview of the most important innovations:

Over the past years, VEM has realised a multitude of individual further developments and improvements to its motors for the cement and mining industries. The following are the most important developments which help to guarantee reliable operation even in environments subject to high temperatures and heavy dust loads:

- Optimised cooling of the active components and the use of new materials enable output to be increased by up to 26 % from the same motor size.
- A new shaft design and rigid cast-iron end shields allow for low-vibration operation even where the machine is mounted on unfavourable foundations.
- The altered force distribution within the slip ring and a new cooling concept enhance mechanical

stability significantly and render the brush cooling more effective; the motors are consequently more robust against unfavourable external influences.

- New design criteria aimed at protection of the overhanging rotor winding heads against centrifugal forces, together with adjustments in manufacturing, minimise the mechanical loads placed on the functional electrical components such as the leads between rotor winding and the slip ring.
- Targeted modifications in the area of the bearings include the use of stronger antifriction bearing types, changes to the insulation concept to ensure better temperature distribution, and a new style of grease routing for optimum lubrication.

Cement
industry



A slip ring motor of the type used above all in the cement and mining industries.

VEM has been a prominent supplier of drives for the cement and mining industries for many years.

CHALLENGE MASTERED

With the replacement of a frequency converter for Europe's largest gas storage operator, VEM offers proof of its competence in this field of business.



Bird's-eye view of Storengy's Peckensen natural gas storage site. The company is the number 1 storage operator in Europe and number 4 in the world.

The project actually dates back to 2002. It was in that year that transresch, today incorporated into VEM as the drive systems department, supplied a frequency converter for a pilot installation at the Peckensen cavern storage site near Salzwedel in northern Germany. The converter has been functioning without problems ever since, but was nevertheless getting old. Peckensen today belongs to the company Storengy Deutschland Betrieb GmbH, which was founded in 2008. To guarantee further reliable and uninterrupted operation in the future, despite the increasingly precarious spare parts situation, Storengy decided to replace the converter as a precautionary measure. The order was awarded to the original manufacturer, in the meantime the drive systems department of VEM and as such responsible for supplying complete drive solutions. One special aspect of the replacement project: The motor, transformer, power

cables and control panels were to be left unchanged. As the converter drives a piston compressor in the Ex area, testing of the motor-converter combination is prescribed after replacement. That would normally mean dismantling the relevant system parts for transport to a corresponding test facility. Together with the Physikalisch-Technische Bundesanstalt (PTB), as the responsible test body, however, VEM elaborated an alternative solution. "In the interest of a smooth and rapid replacement, we recommended in-situ testing and indemnified the customer by assuming the associated responsibility and risk," says Thorsten Schulze, the head of the VEM drive systems department. The old and new converters were each brought to the nominal operating point and the PTB engineers collected the relevant measurements. A comparison confirmed the flawless operation of the new frequency converter. The final project summary was thus: satisfaction on all sides.

The new converter which has already been installed by VEM



PREPARATIONS FOR THE HIGH SEAS

VEM is working at full steam on new shipbuilding projects, among them yet another princess.

When the "Sky Princess" sets off on its maiden voyage on 20th October 2019, the power supply on board will be maintained by four VEM generators with outputs of 2 x 18 000 kVA and 2 x 21 000 kVA. The two main drives of the cruise liner are similarly heavyweights with outputs of 18 000 kW each. Furthermore, six thruster motors have been sent on their way to the Italian Fincantieri shipyard for incorporation into the latest ship to be built for cruise line Princess Cruises.



The VEM location in Dresden has again received follow-up orders for further marine projects from Wärtsilä SAM Electronics. The equipment supplier and VEM already look back over many years of successful cooperation.

On the seven seas

The VEM product portfolio for the marine sector includes also motors and generators for container and research ships, ferries, special-purpose vessels and yachts. At Sachsenwerk in Dresden, low-speed shaft generators are currently being built for three container ships. The poles are to be packed separately for forwarding together with the generator, and will then be mounted on the corresponding drive shafts on site by our customer service. A new research ship for the Faroe Islands, furthermore, is being equipped with a double-winding asynchronous machine as its main drive. The special aspect of this project is the demand for operation to be as quiet as possible. The concept presented by Wärtsilä SAM Electronics in cooperation with VEM convinced the owners and secured the order.

The fourth Royal-class ship taken into service by Princess Cruises will be named "Sky Princess" and is scheduled to make its maiden voyage in the Mediterranean in autumn 2019 – with generators, main drives and thruster motors supplied by VEM.

NEW PRICE LIST 2018

This photograph taken at VEM motors in Wernigerode adorns the front cover of the 2018 price list for low-voltage motors. The online document can be obtained through your responsible sales contact or else downloaded from our website.

Click [here](#) to see the new price list





Our map shows the locations of North and Baltic Sea wind farms for which VEM has supplied generators and auxiliary drives.



The turbines of the first stage of the wind farm – Trianel Wind Farm Borkum I – are already supplying electricity to the national grid.

Trianel Wind Farm Borkum II (TWB II)

- Stage 2 with 32 wind turbines of type Servion 6.XM
- Planned completion by the end of 2019
- Total output capacity of approx. 200 MW
- Production forecast of approx. 800 million kWh per year
- Production sufficient to supply around 200 000 households with green energy
- Trianel Wind Farm Borkum is the first purely municipal wind farm in Europe.
- Stage 1 of the wind farm (Trianel Wind Farm Borkum I/TWB I), with 40 turbines, was taken into full service in September 2015.
- TWB I and TWB II share a substation platform and the grid connection is likewise already in place.

www.trianel-borkum.de

GENERATORS FOR A NEW OFFSHORE WIND FARM IN THE NORTH SEA

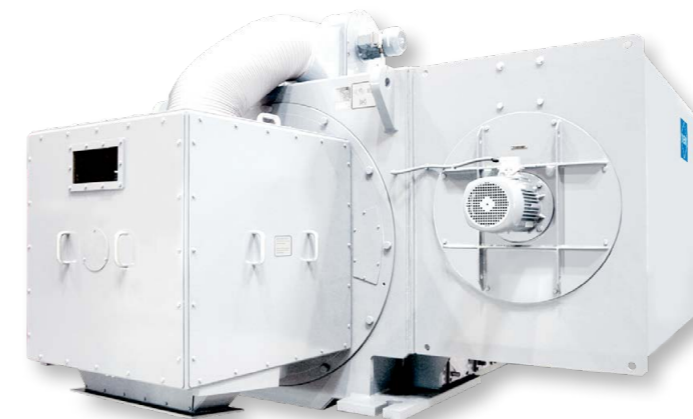
As a pioneer of offshore applications, VEM is now back in the North Sea.



The most recent project is the Trianel Wind Farm Borkum II in the German Bight. Erection is starting this spring, and VEM will be supplying the generators for 32 wind turbines from the middle of the year. They each possess an output of 6.5 MW and are being built at the VEM location in Dresden. In addition, the generators are to be supplemented with auxiliary cooling unit drives from VEM in Zwickau.

Turning into the wind

Further VEM products for offshore installations, alongside cooling unit motors in all sizes for outputs up to 7.5 kW, include low-voltage machines for the pitch and yaw drives. At VEM in Zwickau, brake motors of type BU1R 112, which form a single working unit together with a gearbox, were developed specifically for the latter purposes. On the wind turbine, they serve to turn the nacelle and rotor blades according to the wind direction, and in this way enable maximum utilisation of the available wind energy.



Wind generator, on- and offshore, up to 7 MW



Yaw drive 3.7 kW



Pitch drive 5.3 kW



The future relies on drive – progress relies on motors
With VEM, you benefit from a unique product range covering outputs from 0.06 kW to 60 MW.



Corporate design

Corporate design

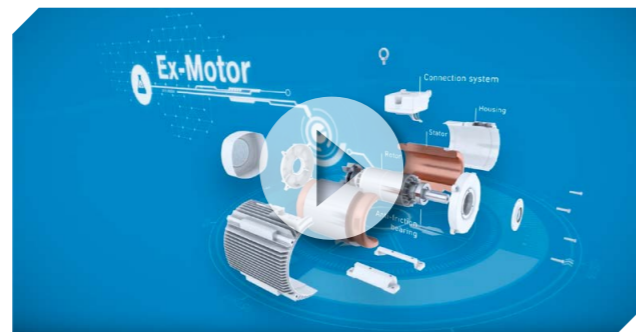
VEM PRESENTS ITS NEW CORPORATE DESIGN

All marketing materials are being treated to a fresh layout

At the latest at the SPS trade fair last November, customers and fair visitors were able to admire the new eye-catching corporate design of the VEM Group. The conversion is not yet complete, but numerous media are already sporting the new design. These include the current image brochure, which packs explanations of our origins and philosophy, insights into our portfolio and portraits of our most important assets – our employees – into a modern layout. In other words: it shows who we are and the rate at which VEM's heart beats for electric drive solutions.

If you visit our website, you can already gain an impression of the products of the VEM group by watching the image film on the home page. With application examples and modern animations, the film visualises our broad spectrum of offers for all branches of industry – from single motors to complete drive systems.

www.vem-group.com



The image film captivates with modern animations.



The current image brochure is available in German and English.

People

“WE HELP BUILD SPECIAL PRODUCTS IN SERIES”

Stephan Naumann is the new head of manufacturing technology at the VEM location in Wernigerode.

When Stephan Naumann came to VEM motors GmbH in Wernigerode 15 years ago, with a fresh degree in industrial engineering in his pocket, his first workplace as manufacturing technologist was the mechanical production hall. The manufacturing technology department is responsible for designing production processes and as such plays a key role within the company. “The designers create drawings and other documents to implement the wishes expressed by the customer,” says Stephan Naumann. “Our task is then to determine whether and how a product can be manufactured with our existing resources, or how these resources must be adapted or reorganised.”

“A wealth of experience and the high proportion of in-house manufacturing at our location are excellent prerequisites.”

In other words, the challenge for the technologists is to help build special products in series. “In this respect, a wealth of experience and the high proportion of in-house manufacturing at our location are excellent prerequisites,” says Stephan Naumann. He has now been head of a team of 13 employees in the manufacturing technology department since December 2017. In this function, he also serves as an interface between various technical and business processes, which was already an important aspect of his studies.

In addition to their organisation of manufacturing processes, Stefan Naumann and his technologists contribute to a diversity of other projects which have a bearing on production in one way or another.

“It is the quest for an ideal solution which drives me.”

Stephan Naumann can rely on a highly motivated team of competent specialists. There are numerous examples of how they have together identified potential for improvements at the VEM location in Wernigerode. After all, everyone is pulling together – manufacturing technologists, management and the colleagues on the machines themselves. The most important objective is to adapt the production process precisely and in good time to current customer wishes. In this context, Stephan Naumann makes special mention of the positive improvement suggestion scheme run by the company. Many a valuable idea has reached his department in this way.

“It is the quest for an ideal solution which drives me,” Stephan Naumann emphasises. “And if you manage it once, then you automatically want to repeat your success as often as possible.”

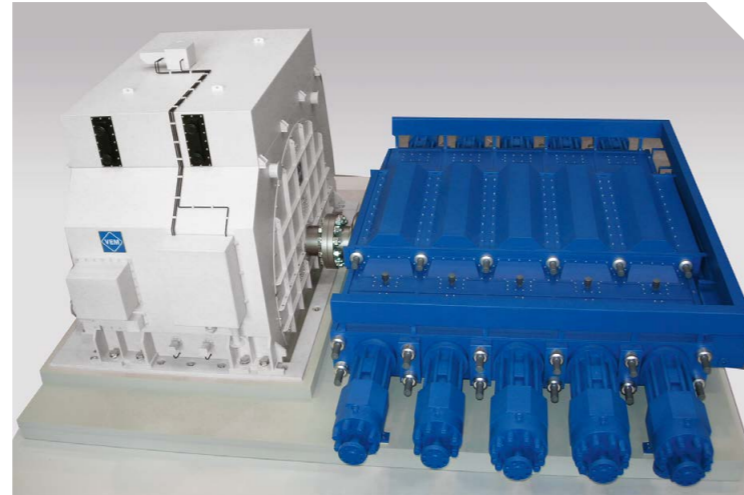


As head of manufacturing technology, Stephan Naumann can build upon character traits which already served him well as a hobby footballer: team spirit, motivation and stamina. Born in Dessau, he is married and has a six-month-old daughter.

HEAVYWEIGHTS FOR PLASTICS PRODUCTION

With components for an LDPE plant in China, VEM plays out its strengths as a supplier of complete drive systems.

Drives for an LDPE plant producing polyethylene in a low-pressure process are on their way from the VEM location in Dresden to the Chinese city of Quanzhou. For this project, VEM is again working together with general contractor Burckhardt Compression AG. Alongside a 3.9 MW booster compressor motor with exciter, VEM is supplying a 13 MW hypercompressor motor with exciter, including the 35/10 kV mains transformer, the busbars from the transformer to the mains, the 10 kV switchgear and the starting transformer. VEM is a longstanding and reliable supplier to the chemical industry and is here able to play out its strengths as a supplier of complex drive systems. All plant components are being built to customer specifications. The final plant for production of the world's most frequently used plastic is scheduled to be ready to start production in about 12 months.



These two models offer an impression of the VEM motor (white) and the Burckhardt compressor (blue). The original motor, which weighs 123 tonnes, is approx. 6.30 metres high and 6.70 metres wide.

Steel and rolling mills

TAILORED SOLUTION FOR CONVERTED GALVANISING LINE AT POSCO



The AC motors supplied by VEM have stood the test at the POSCO steelworks in Gwangyang in South Korea.

VEM has supplied 50 AC motors to the Gwangyang plant of the world's fourth-largest steel producer POSCO in South Korea. Plant manufacturer Primetals Korea was commissioned by POSCO Gwangyang to convert a galvanising line from DC to AC technology. This meant conversion of both the drive systems and the motors. The motors were placed on steel-plinth foundations in order to facilitate adaptation.

The VEM motors are tailored specifically to the customer's requirements. They possess forced ventilation (IC416) and a second shaft end (IM 1002), on which brake drums from the mechanical contractor are installed. Since commissioning a year ago, the VEM motors have demonstrated outstanding reliability and performance. In fact, the customer has issued a certificate confirming his satisfaction.

VEM AT TRADE FAIRS 2018

This year, too, you can meet us in person at leading international trade fairs in Frankfurt, Amsterdam, Hamburg, Berlin and Nürnberg.

Our fair calendar for 2018 contains entries for at least six major trade fairs, where we look forward to welcoming you on our stand.

- **ACHEMA** – World Forum and International Show for the Process Industries
from 11th to 15th June, Frankfurt am Main
- **Electric & Hybrid Marine World Expo** – International Exhibition of Electric and Hybrid Marine Propulsion Systems, Technologies and Components
from 27th to 29th June, Amsterdam
- **SMM** – International Maritime Trade Fair
from 4th to 7th September, Hamburg
- **Innotrans** – International Trade Fair for Transport Technology
from 18th to 21st September, Berlin
- **WindEnergy** – The Global On- and Offshore Expo
from 25th to 28th September, Hamburg
- **SPS IPC Drives** – International Exhibition for Electric Automation Systems and Components
from 27th to 29th November, Nürnberg



The fair stand at SPS IPC Drives 2017 in Nürnberg was the first public project to be presented in the new corporate design.



COMMITTED AND COMPETENT

Kurt Maier Motor-Press sells VEM drive solutions in southern Africa and increasingly also in the USA.

Those in the know use only the initials “KMMP” when referring to the trading company Kurt Maier Motor-Press. The links with VEM date back to 1992, when the two companies signed a dealership agreement. KMMP sells above all VEM low-voltage drives in the African countries south of the Equator and in the USA. “Here in South Africa, we are known under the trading name EMAC,” says managing director Wolfram Maier. He and his team have coordinated sales from their own office premises and warehouse in an industrial suburb of Johannesburg since 2000. Originally, most sales were standard motors, but the focus has in the meantime shifted to primarily customer-specific solutions. Slip ring motors play a major role. They are used above all in new projects in the mining industry and for crane installations. “At the moment, for example, we are working on an order from a plant contractor who, by 2019, requires around four hundred 37 kW motors for a water-jetting system for underground use in the gold and platinum mines,” says Wolfram Maier.

Business upswing in the USA

The sales subsidiary Kurt Maier Motor-Press (USA) was established in 2004. For several years, the most important objective was the procurement of replacement motors.

But since last year, everything has changed. The reason lies in the EISA approval granted to VEM motors by the US Department of Energy. This means that it is now possible to satisfy the strict energy efficiency requirements of the North American market with low-voltage drives from VEM in Wernigerode. EISA approval for the smaller motor sizes which are manufactured at the Zwickau location is already in the pipeline. “Our offices in the USA are located in the heart of the Shenandoah Valley of Virginia,” says Wolfram Maier. But the company also cooperates with motor dealers in Pennsylvania, Arkansas and Texas. And plans are already on the table for further expansion of the US sales network this year. Michaela Möser from VEM in Wernigerode has no doubts that this will be a resounding success. She is responsible for sales in the world regions served by KMMP and is full of praise for the longstanding trustful partnership: “You can almost feel the passion with which Wolfram Maier and his highly committed and competent team realise projects and pursue their objectives.”

www.kmmp-usa.com | www.emac-online.com



EMAC headquarters in a suburb of Johannesburg



A general impression of Staunton, where the US sales subsidiary Kurt Maier Motor-Press (USA) is located

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