

Issue 01 | 2019



IMPULSE

Power
generation

Energy from deep
underground

TRACTION

EUROPEAN TRAM
BUSINESS IS BOOMING

ECTR PROJECT

ANOTHER STEP TOWARDS
INDUSTRY 4.0

INVESTMENTS IN THE FUTURE



DRESDEN INVESTS IN NEW INSULATION ROBOT

The production capacity for high-voltage coils at the Dresden VEM location has practically doubled following investment in a further insulation robot.

The impact was almost immediate. The recent purchase and installation of a new insulation robot has enabled VEM Sachsenwerk GmbH to almost double the number of high-voltage insulated copper-wire coils it can produce. That not only expands production capacities, but also improves overall production conditions for VEM. At the same time, the commissioning of the new plant – at a cost of around €750,000 – is an investment in the future. “We intend to continue with further investments to support our core competences winding and coil manufacture over

the next two years. After all, they represent the heart of an electric machine,” says Sebastian Wolf, head of the coil manufacturing department. “With the new insulation robot, we are now even better able to meet both our own quality ambitions and the ever-increasing demands of our customers,” he continues. With reference to the bulging order books, he also emphasises that this modern technology does not place jobs in danger. On the contrary, it is actually contributing to the creation of new jobs at Sachsenwerk.



The new insulation robot in action

ZWICKAU INVESTS IN THE REDESIGNING OF A PRODUCTION HALL

Everything is now ready for the next step in redesigning of the entire hall.



WERNIGERODE INVESTS IN NEW MACHINING CENTRE

VEM motors GmbH in Wernigerode has invested in a new VHC2-3000 XTS machining centre from AXA Entwicklungs- und Maschinenbau.

A keen eye and a steady hand were necessary to manoeuvre the new shaft end machining centre into the production hall at the VEM location in Wernigerode.



When the shaft end machining centre enters production in the third quarter of 2019, it will realise several technological benefits. The swivel-head milling spindle will permit the machining of shaft ends for all shaft heights required in Wernigerode. In the past, the unmachined shafts had to be sent to an external provider to be cut to length and centred. In future, these process steps can be handled on the new machine. That not only enhances in-house value creation, but also enables better and more flexible response to individual customer wishes. Another plus: In-house manufacturing is a key to even higher quality, thanks to unbroken monitoring of the production process.

In addition, the new machining centre allows more flexible organisation of the cutting and centring stages, for example by enabling key slots to be milled into otherwise finished shafts. Working conditions are also improved by the generous layout of the production hall, especially when working with unmachined shafts in lengths over 3,000 mm. All in all, the purchase of the shaft end machining centre is in every way a good investment, as it renders replacement of an older machine superfluous.

Many of the machines in the mechanical workshop have already been replaced over the past years. The idea is that the machining of rotors, shafts, housings with terminal boxes and now also end shields should be controlled according to material flows. The placing of an order for two new EMAG VL5i machining centres was an ideal opportunity to redesign the production area for end shield machining. In summer 2018, work began with partial refurbishment of the floor. The entire EV cabling was replaced and data lines were laid to enable integration into the company's SAP system and thus paperless manufacturing in the future. Following commissioning of the machining centres in October 2018, EMAG provided on-site training for the operators. One of them is Dirk Schubert. He manufactures end shields of all sizes in grey cast iron or aluminium for projects requiring batches of at least 10 workpieces. The EMAGs can also be used for contract production for other VEM locations. There is now nothing in the way of progress to the next step.

Dirk Schubert has been working on the new EMAG VL5i end shield machining centres since October 2018.

EUROPEAN TRAM BUSINESS IS BOOMING

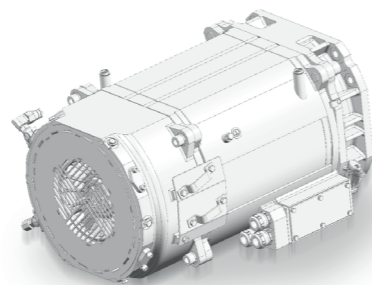


VEM recorded its largest-ever volume of incoming orders for traction machines in 2018.

Orders for 600 motors for tram and urban rail systems for the current year, and many further projects for realisation in 2020 – VEM is experiencing an unprecedented boom in transportation business. Trams in Berlin, Frankfurt am Main, Leipzig, Bielefeld and other German cities are driven by motors from VEM Sachsenwerk. And traction motors from Dresden are similarly the drive of choice for trams in Kiev and Moscow, Krakow or Sofia. After all, VEM has long since earned an outstanding reputation in the branch for its quality products.

“After a number of unsuccessful attempts, we have now secured an order to supply traction motors for the tram system in the Polish city of Krakow together with Stadler Polska,” says Hans-Georg Becker, head of transportation sales at Sachsenwerk. “I am especially pleased about this order for 50 trams from Poland, because it was a long battle and we faced some very strong competitors.”

The increased demand is also an indication that more and more cities are expanding their local public transport systems. Cities are growing, more and more commuters are travelling to and from the surrounding regions, and environmental issues are playing an ever greater role in people’s thoughts. “And trams,” as Hans-Georg Becker points out, “are one of the finest implementations of electromobility.”



VEM traction motors of this type drive trams in many European and international cities.



DURABLE AND ROBUST UNDER EXTREME CONDITIONS

Roller table motors in a new special version are designed to handle even the most extreme conditions in the rolling mill industry.

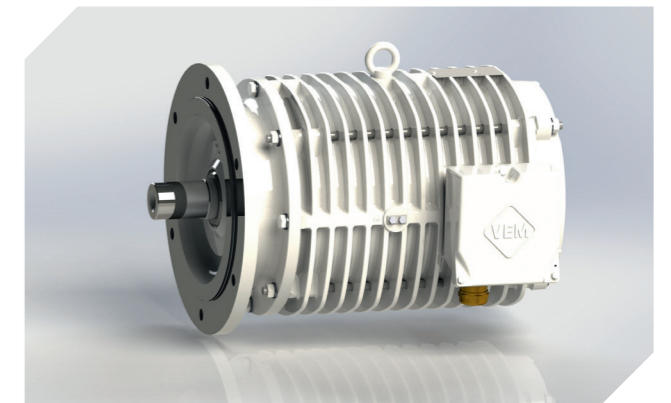
All drives used in steel and rolling mills are subject to enormous stresses. But even here, there are certain applications which seem to push things to the limit, for example heavy mill stand drives with reversing functions. To cater for such extreme conditions, VEM has developed a new special version of heavy-duty roller table motor. This special drive rounds off the company’s range of transport applications for the steel and rolling mill industry.

The new drive machine is based on the proven design principle of the ARC series from VEM. The torsionally rigid ribbed housing of the classic version has been further modified to withstand the heavy impact loads. The housing and N-end shield are manufactured using highly resilient spheroidal graphite cast iron. The flange mountings, too, promise maximum robustness and are well prepared for even the heaviest mechanical stresses. The one-piece steel flanges are manufactured from alloyed heat-treated steel in a force-flow-optimised design and mounted by way of high-strength bolts and tie rods. The tie rods are passed through holes in the circumferential ribbing. Featuring IP 66 protection, the new drive braves even extreme ambient influences, whether scale, dust or water. It is suitable for converter fed operation, direct mounting or mounting with an intermediate gearbox. Existing drives can also be replaced with the new special version, as the mounting dimensions remain unchanged.

The first motors of this special version in size 180 are already proving themselves on a heavy blooming stand.

Heavy-duty roller table motors for straightening machine

Companies throughout the metallurgical industries have appreciated VEM as a manufacturer of robust and reliable drive solutions for their plants for many decades. An order from Austria furnishes the latest proof of this fact. The project comprises 11 machines in size 400, which are scheduled for delivery already before the summer.



Special roller table motor ARC 180M 8
8.80 kW, 736 rpm, S3-60%
400 V Y, 50 Hz, thermal class 155 (F)
IC 410, IM B5, IP 66
Shaft material: Alloyed heat-treated steel
Shaft dimensions: According to customer wishes

VEM MOTORS WITH CEL LABELS

The product range bearing the China Energy Label CEL covers shaft heights from 80 to 355.



CEL labels of VEM motors Thurm GmbH (left) and VEM motors GmbH (right). The QR codes provide access to the certificate and relevant type data of the motor concerned, for example type designation, efficiency, output and number of poles. The Chinese authorities have generated individual QR codes for each motor type.

CEL certificate for motor type IE3-KPR 80 G4



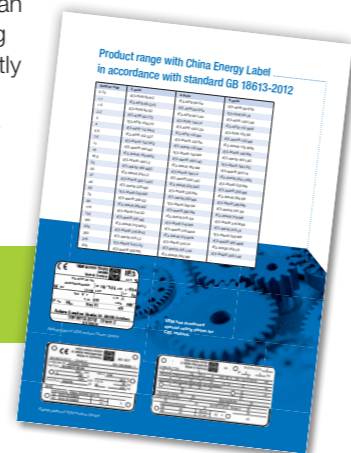
Efforts to reduce energy consumption and emissions of greenhouse gases are important aspects of the global fight to limit climate change. To support this objective, many industrialised and emerging countries have adopted regulations aimed at higher energy efficiency. Especially in countries with strong economic growth and a correspondingly high demand for energy, efficiency improvements are an opportunity to reduce consumption and to relieve the pressure on our finite stocks of non-renewable energy resources. One of the countries which immediately comes to mind in the context of economic growth is China. As a means to promote energy efficiency, the standard GB 18613-2012 was adopted in 2012 and requires the certification of all motors which are to be used or brought onto the market in China. The standard specifies, for example, that all low-voltage three-phase motors for the output range from 0.75 to 375 kW must meet the requirements of the Chinese efficiency class Grade 2 (equivalent to IEC efficiency class IE3). Energy-saving motors which are covered by the standard GB 18613-2012, meet the requirements and successfully complete the certification process are entitled to bear the China Energy Label in accordance with the directive CEL 007-2016.

Versions with 2 to 6 poles

VEM is now in a position to supply a full range of low-voltage asynchronous motors with CEL labels in shaft heights from 80 to 355 and in 2-, 4- and 6-pole versions. In this way, VEM has safeguarded extensive access to the Chinese market. A QR code enables users to call up the underlying CEL certificate, with which the Chinese authorities confirm compliance with all demands of the CEL standard.

A CEL label with minimum dimensions of 66 x 45 mm (see above left) is attached on the fan cover of the motors. Corresponding markings are also placed prominently on the packaging. It must be noted that the type designation and modifications must match those on the filing for certification.

Product details can be found [here](#)



Save the date

VEM FAIR CALENDAR 2019

You can meet us at trade fairs in Houston, Shanghai, Rotterdam, Amsterdam, Gdansk, Bangkok and Nürnberg.

We are presenting our branch-specific drive solutions at numerous international trade fairs and congresses in 2019. Logistics, the chemical, oil and gas industries, shipbuilding and transportation are just some of the topics. We look forward to welcoming you on our stand.

- **OTC** – Offshore Technology Conference – Exhibition and conference on offshore technologies **from 6th to 9th May**, Houston/USA
- **AchemAsia** – International exhibition and congress on chemical engineering and biotechnology **from 21st to 23rd May**, Shanghai/China
- **TOC Europe** – Conference for port, shipping and terminal technology components **from 18th to 20th June**, Rotterdam/Netherlands
- **Electric & Hybrid Marine World Expo** – International exhibition of electric and hybrid marine propulsion systems, technologies and components **from 25th to 27th June**, Amsterdam/Netherlands
- **TRAKO** – International railway fair **from 24th to 27th September**, Gdansk/Poland
- **OGET/TMOX** – Oil, gas and petrochemical exhibition and marine expo **from 9th to 11th October**, Bangkok/Thailand
- **SPS** – International trade exhibition for electric automation systems and components **from 26th to 28th November**, Nürnberg/Germany



Trade fair impressions from SPS 2018 in Nürnberg

INVERTERS FOR WATER SUPPLIES IN SAUDI ARABIA

Existing equipment can be upgraded with new technology and modern plant control.

Saudi Arabia obtains a large proportion of its water from large-scale desalination plants along its coasts. This water is then distributed around the country via thousands of kilometres of pipelines with countless pumping stations.

Since the end of February, water supplies in the Saudi Arabian province Qassim can rely on equipment bearing the brand name VEMoDRIVE (powered by Elektrotechnika). New load-commutated inverters and new DC link reactors have replaced four old LCIs with outputs of 1.5 MW at 1.3 kV and 3.4 MW at 2.3 kV at the company SWCC (Saline Water Conversion Corporation).

The customer can also continue to use the existing motors and pumps with the new reliable technology and modern plant control. And that without any need for modifications to the overall control system, the transformers or the upstream switchgear. VEM was here responsible for project planning, deliveries, removal and installation of the inverters and commissioning.

Special customer wishes

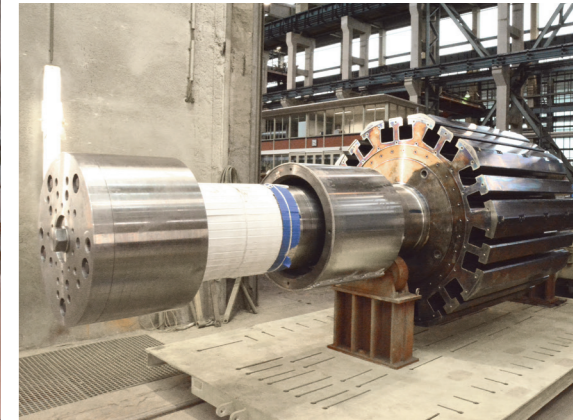
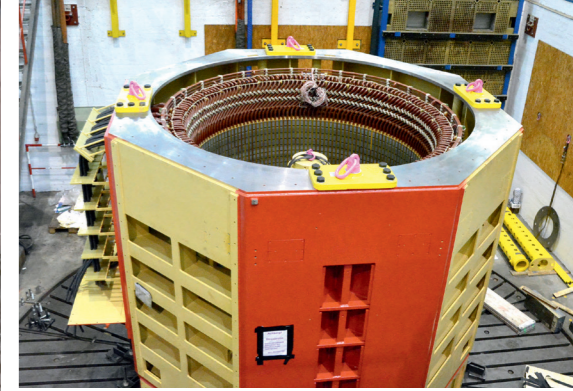
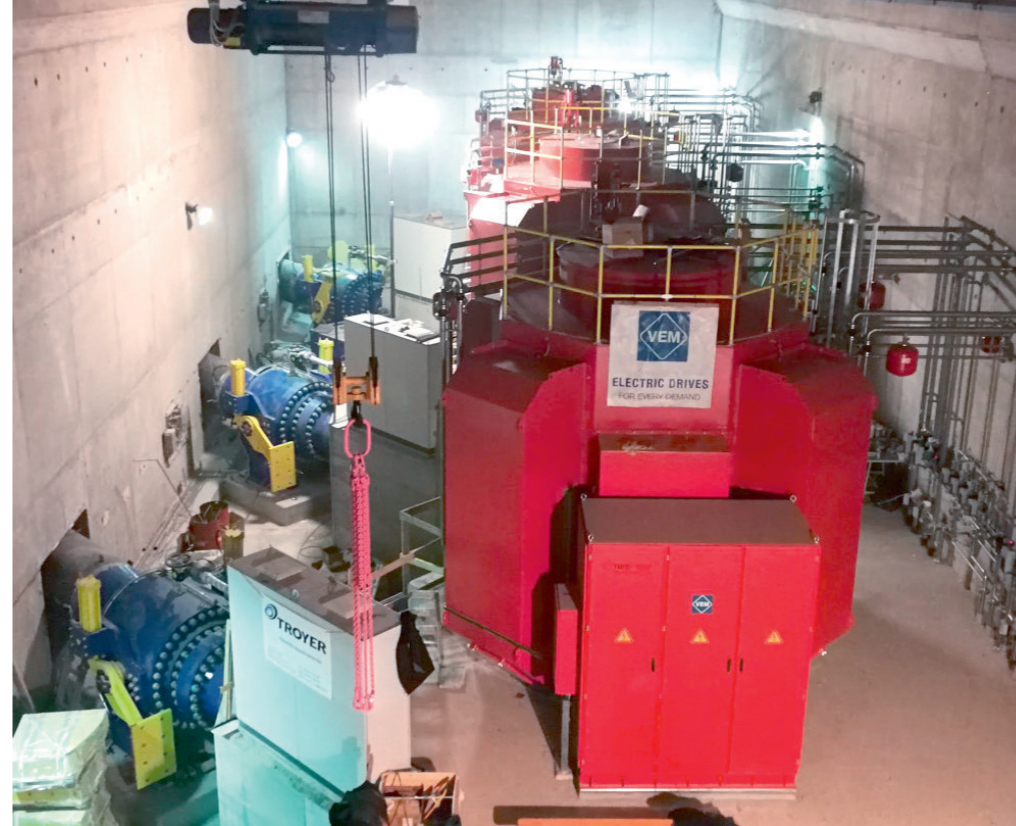
The planning for this project required several special customer demands to be taken into account. These included replacement of the existing cooling using the outside air, as this caused excessive dust to be drawn into the control room and the electronics. This problem could be solved by installing a purely internal air circulation, as the high energy efficiency of the LCIs avoided any excessive warming of the room. Another challenge was re-use of the high-voltage cables, which were embedded in concrete. Here, VEM designed the control cabinets such that the cable terminal points lined up exactly with the existing cables. Further customer wishes, such as temperature-controlled fans and a telephone in the control cabinet to facilitate contact to the control room in case of problems, were realised directly. VEM recently supplied several SCCs

(subsynchronous converter cascades) for machines with slip-ring rotor to Saudi Arabia, and this no doubt helped to secure this order for a different converter technology. The first four LCI installations are preparing the ground for the planned exchange of another 14 old systems.



The customer can continue to use the existing motors and pumps with the new reliable technology and modern plant control.

Power generation



ENERGY FROM DEEP UNDERGROUND

Three hydropower generators from VEM supply up to 90 megawatts of electrical energy at the St. Anton power plant to the north of Bozen.



The St. Anton hydropower plant built on the River Talfer near Bozen in 1951 is at present the fifth-largest hydropower plant in South Tyrol, with an annual capacity of 270 million kWh. As part of a major modernisation project, VEM is supplying three hydropower generators with a rated output of 39 MVA each. This enables the amount of energy fed into the local grid each year to be increased by more than ten per cent. The total capacity will thus now top 300 million kWh. To achieve this result, the generators were designed for an efficiency of more than 98 per cent.

Safe under high-voltage loads

For generator operation 300 metres underground, it is imperative to ensure a very low partial discharge level under high-voltage loads, in order to avoid the exceeding of health-critical ozone thresholds. A first partial discharge measurement is performed on the company's own test stand to evaluate the quality of the insulation system of the 13.8 kV winding. The results then serve as reference values for future measurements which are to be arranged by the operator for regular assessment of the machine condition.

From the design perspective, this project posed interesting challenges with regard to the mechanical strength: The runaway speed of the Pelton turbine, at 1,080 rpm, lies far above the operating speed of 600 rpm. Particular attention must be paid to the mounting of the poles, which are attached to the rotor by way of hammer-head T slots. At the request of the customer, the generators also possess a permanently excited auxiliary exciter machine to supply the generator exciter. This configuration replaces the typical auxiliary exciter winding.

First water already in sight

Following successful test stand acceptance on the manufacturer's premises, the three generators were dismantled into transportable units and delivered to the customer site at the end of 2018 and beginning of 2019. By March this year, they were then assembled mechanically and electrically and prepared for commissioning in accordance with the VEM specifications. Now that all dry-run tests have been completed successfully, the next steps are wet commissioning of the generators and final acceptance of the project, which can be counted one of the most important VEM projects ever.

WORK IS NOT OVER UNTIL THE LAST POINT HAS BEEN CLARIFIED

Christian Krökel heads the ECTR project at VEM motors in Wernigerode.

Wernigerode-born Christian Krökel was already interested in computers and machines as a schoolboy. But perhaps he inherited this passion from his father, who worked at the local factory of VEM motors. For Christian Krökel, it was a logical decision to learn the trade of an industrial mechanic at VEM as a first step on the road to obtaining university entrance qualifications. Already at this time, he enjoyed designing parts and assemblies at the computer – ideal preparation for the mechanical engineering studies which he subsequently completed at the University of Applied Sciences (HTW) in Berlin.

As a freshly graduated engineer, Christian Krökel's career began in consulting firms in the field of CAD for Siemens products. His comprehensive knowledge and experience with CAD applications, software systems and IT solutions relating to product life cycle management were here invaluable. He was also able to pass on his know-how in training measures associated with his consulting work. At the beginning of 2018, Christian Krökel decided to leave Berlin and return to his home town of Wernigerode and rejoin VEM motors as a designer in February of that year.

By chance, that was also the time at which Dr. Joachim Koch became a member of the VEM management board and at the same time managing director of VEM motors. "He brought many fresh ideas into the company," as Christian Krökel recalls.

"He brought many fresh ideas into the company."

It was no doubt one of those ideas which lead the head of development to ask whether he was interested in managing a new ECTR project. There was no need for Christian Krökel to think twice when offered such an exciting task. The subject has been filling his thoughts ever since. Each defined objective is pursued in a structured and carefully planned manner. One of the keys to success, he believes, is to ensure that everyone is properly involved. And most important of all: "The work is not over until the last point has been clarified."



Christian Krökel (28) is married and has a young son. His hobbies include gliding and running. He will also be taking part in the forthcoming business team challenge in Wernigerode.

ANOTHER STEP TOWARDS INDUSTRY 4.0

Implementation of the ECTR project in IT heralds significant changes at VEM motors.

Anyone who deals with Industry 4.0 knows that the crucial aspect is networking. That is precisely the point targeted by the project to introduce ECTR with SolidWorks (see info box). "The idea of the new software is to centralise machines, departments, documents and data such that, in future, all information on the development of a component can be brought together transparently, irrespective of the individual source", says project manager Christian Krökel.

That begins with production planning and continues via manufacturing and application calculations, through to maintenance and final disposal. A 3D model and drawing elaborated by the design engineer will in future pass through all participating departments: Production planning, sales, purchasing, manufacturing, where necessary even testing and finally shipping. Everyone involved in the process has direct access to every document associated with the motor. This integration of all information and departments along the entire value chain for the components in a system is called product life cycle management, or PLM for short. It is a fundamental element of Industry 4.0 and of the digital factory of the future.

Isolated applications disappear

According to Christian Krökel, one of the biggest challenges to be overcome during implementation of the project is replacement of the current CIM database: "The decision to depart from all these isolated software applications is like a move to a new home. Everything has to be sorted out, carried over to a new location and pieced back together in usable form."

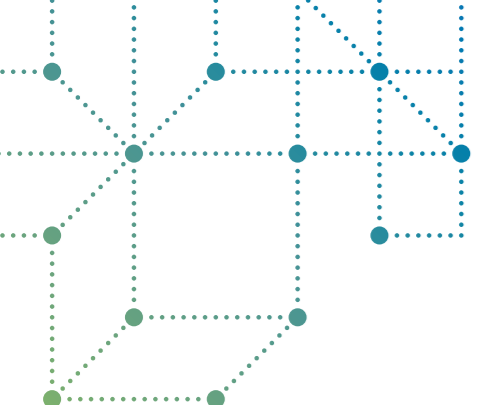
An enormous task for which the employees have been prepared with extensive training. And Christian Krökel knows a few arguments which should help to spread his enthusiasm for the project to others. The workers in the production department, for example, will be able to see how a new component was envisaged by the design engineer and how it will later be incorporated at the motor. The opportunity to progress along the road to a paperless factory is another benefit of ECTR. The new IT solution, which supersedes older applications as the SAP standard, is not used in every company. But VEM motors sees great potential in this solution. Elsewhere in the group, Sachsenwerk is already working successfully with ECTR in Dresden. The team in Wernigerode can now call upon this experience and the two locations will be able to forge ever strong links in this respect.

SAP ECTR and SolidWorks

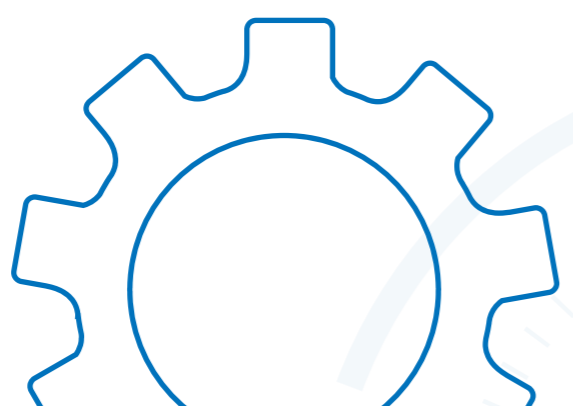
The engineering control centre ECTR combines data from all authoring systems with SAP. The integration platform documents the value chain of a component over its entire life cycle, provides for structured central administration of the product data, and can be linked with other locations and systems. A common intuitive user interface enables company-wide access to all product data.

SolidWorks is a CAD authoring system to design and calculate components in a 3D environment and to create production-ready drawings.





17th TECHNICAL CONFERENCE



VEM INVITES YOU TO THE 17TH TECHNICAL CONFERENCE

18th and 19th September 2019

“Focus on drive technology – Innovative developments in a traditional branch” is the motto chosen for this year’s VEM Technical Conference. The two-day knowledge forum on current developments of particular relevance to the branch will as always provide a setting for pertinent discussions of opinions and experiences. Central topics include product developments for low- and high-voltage applications, as well as for drive systems, digitisation of the branch, technological developments in electrical engineering, the use of new materials, new European legislation on energy efficiency and its impact, and new applications for electric drives with corresponding examples.

Dates: 18th and 19th September 2019
Venue: Harzer Kultur- und Kongresshotel (HKK), Pfarrstraße 41, 38855 Wernigerode
Registration: VEM motors GmbH; Kerstin Margila, tel.: +49 3943 68-3297; e-Mail: kerstin.margila@vem-group.com or Lutz Schube, tel.: +49 3943 68-3244, e-Mail: lutz.schube@vem-group.com

VEM looks forward to welcoming you to Wernigerode in September.

“Focus on drive technology – Innovative developments in a traditional branch”



COMBINED FROM MOTOR TO SWITCH CABINET

New possibilities with the uniform connection system VEMoCONTACT.

The idea is as simple as it is effective. The new connection system VEMoCONTACT uses WAGO rail-mount terminal blocks and accommodates conductor cross-sections from 1.5 mm² to 16 mm² (or 25 mm² flexible). The Wernigerode designers Andreas Rudolph, Thomas Wallnisch and Martin Rattay are currently testing the system up to shaft height 315 or 185 mm². In Zwickau, designers are looking into use of the alternative connection system up to shaft height 112.

The new system behind the name VEMoCONTACT brings not only safety-relevant, but also economic benefits for the customer. On the one hand, cable lugs are no longer necessary; both flexible and solid conductors are simply clamped without tools. This is a decisive time factor for the customer. In addition, Y and

D circuit variants can be achieved by way of push-in jumpers. The resistance to vibration and shocks is also increased compared to a stud terminal board, and all terminals can be labelled with up to 4 lines of information. The motor and auxiliary connections are arranged on one DIN rail. The voltage range for the new connection system extends to 800 V in the case of asynchronous motors for standard applications, marine and brake motors, and permanent-magnet synchronous motors, up to 500 V for Ex motors and up to 600 V for motors in accordance with foreign regulations (for example UL, CSA..).

The result: VEMoCONTACT is a fast, modern and safe connection system comparable to that used in switch-gear engineering.

VEM in the trade press

CORRECT SELECTION OF INSULATION SYSTEMS FOR CONVERTER-FED MOTORS

Drive systems from a single supplier optimise matching of the loads placed on the insulation of electric machines.

An article in the trade magazine “antriebstechnik”, issue 1-2/2019, discusses the criteria which apply when selecting an insulation system for converter-fed motors in order to ensure that it matches the actual load conditions and thus to guarantee cost-optimised dimensioning. On the basis of applicable standards, the article describes a calculation method with which a more favourable assessment than the worst case can be assumed, even where certain demands on the system are unknown.



You can read the article [here](#)

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