



Special supplement
VEM motors celebrates two anniversaries in Wernigerode

IMPULSE SPECIAL



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EDITORIAL

Dear readers,

Driven by exports and supported by stronger domestic demand for capital goods, the situation on the German machinery and electrical engineering markets has taken a turn for the better. This applies in the first instance to quantities. But the quality of demand, too, has developed further, in particular with regard to special motors adapted for individual applications. We at VEM motors and at Keulahütte already chose to follow a strategy of specialisation some eight years ago and this has proved exceedingly successful.

VEM Sachsenwerk, as a manufacturer of large machines, has always operated according to this principle. Together, the four factories of the VEM Group are thus well equipped to further expand their worldwide success. This is for me reason for optimism and we can justifiably expect continued quantitative and qualitative growth for the years 2007 to 2009.



Photo: Karin Wagner

Tailored solutions

RETROSPECT *The road from series manufacturer to partner for individual drives*

VEM motors. VEM motors is one of Europe's renowned manufacturers of low-voltage three-phase asynchronous motors. The company comprises the two factories VEM motors Thurm GmbH in Zwickau and VEM motors GmbH in Wernigerode. Electric motors have already been produced at both locations for more than 60 years. The roots can be traced back to Zwickau at the beginning of the 20th century. It was at that time the status of developments in industrial mechanisation which determined the technical level of the motors. The first technological advances were only just being introduced into manufacturing. When greater efforts aimed at a standardisation of electric motors emerged in the 1930s, this triggered strong growth in the industrial manufacturing of such motors. The expansion, however, was soon overshadowed by the outbreak of the Second World War, not least through the reallocation of production capacities for military purposes. The manufacturing of three-phase motors was resumed at today's Thurm factory in 1946. The exploding demand for electric motors



continued on page 2 Engineer Olaf Giese inserts a rotor into its stator. The motor belongs to the fans for a tunnel ventilation system.

New investments at Sachsenwerk target higher productivity

INVESTMENTS *Press room and new logistics hall on this year's agenda*



The strip processing plant in the press room has been upgraded with an industrial robot.

VEM Sachsenwerk. The demand for products from Sachsenwerk is increasing in leaps and bounds, especially in respect of wind-power generators, but also regarding traction and industrial motors. The company is reacting with a series of investment projects to establish the technical prerequisites and logistics capacity for planned production expansion. In October 2006, for example, the strip processing line for the stamping of stator and rotor laminations, which is already operating in three shifts, was upgraded with a modern and efficient robot-based removal system. This replaces the old conveyor equipment whose limited transfer speed placed a restriction on the scope for production output. Thanks to the robot technology, the removal of the laminations from the line has been speeded up by 25%. To ensure that no bottlenecks can arise in the downstream processes, a

second new stamping press was taken into service in February of this year. The new machine adds the winding slots to the pre-stamped laminations. With its high reciprocation and transfer rates, it is also able to ensure the rapid further processing of larger batches. The two presses have accounted for some 1.5 million from a total investment package of 3.5 million euros. The next important investment at Sachsenwerk is already under way. The foundations are currently being cast for a new logistics hall. A rail system will link the hall to the adjacent production building. Machine packing and dispatch is set to move into the new hall from September. The hall will also offer storage space for large fixtures required when making up the cores for the various motors. This will free up the valuable production space occupied by these fixtures to date.

It fills me with concern and - I must admit - a certain anger, however, to see how morals are falling by the wayside in various industrial structures. Major corporations are in some cases hiding behind the complexity and anonymity of their pyramid structures to apply methods which can only enflame entrepreneurs and managers who act with a sense of responsibility for their employees. Millions are put aside as bribes for trade union officials and works council representatives, and these millions are also accepted. Executives receive astronomical bonuses for the peddling of corporate divisions and workforces. Trade union

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Fürst Pückler edition

SPECIAL PRODUCTS

New product series to satisfy connoisseurs



Keulahütte. With the name "Fürst Pückler edition", a princely name has been chosen for a "princely" product series. The products complement the

existing product range from Keulahütte and are aimed at private customers with an eye for aesthetic design. Cast-iron lamps based on historical originals from the Art Nouveau period, with matching bollards, garden benches and a stylish flower dish, are the first items.

The particular attention to detail has given birth to an interesting range of castings with scope for future expansion - starting from faithful reproduction of the original designs and right through to the important coating of the final casting.

A catalogue is currently being prepared to illustrate and explain the new product range.



Lamps from the new series line the way to the "VEM House" in Dresden.

Photo: Karin Wagner

Tailored solutions

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was answered with the founding of a new enterprise with 200 employees on the ruined site of a former armaments factory in Wernigerode on 31st January 1947. Economic reconstruction demanded fast deliveries of three-phase motors in considerable numbers. Already in the first four months, the first 200 motors with outputs of 11 kW were manufactured in Wernigerode to the old plans. Production increased rapidly over the subsequent years, culminating in the mid-1950s in the introduction of the first motors from the enterprise's own design offices, the DMK series. This series embraced both squirrel-cage and slipring motors with outputs up to 10 kW.

Motors from the factories in Thurm and Wernigerode, which were sold under the VEM trademark from 1948 onwards, gained a ever stronger presence on the international markets. Further developments served to establish an invaluable pool of know-how and experience, and at the end of the 1970s, the front-line of technical prog-

ress in Europe was reached with the KMR/KMER series (Fig. 1).

The launching of this series also marked the beginning of large-scale series production for standard motors in Wernigerode and Zwickau. New fields of application and extended performance ranges fuelled further significant increases in the production figures up to 1989. The social and political changes after 1989 and until around 1993 placed considerable pressure on industry in Eastern Germany, and the electrical engineering branch was not spared. Despite the fact that VEM was manufacturing progressive and internationally competitive motors to the highest quality standards, the loss of many longstanding partners on the domestic market, and above all the discontinuity in business relations to customers in Eastern Europe in the wake of political and economic upheavals, led to a distinct decline in production and called for fundamental reorientation with regard to target markets. This process was accompanied by a

complete restructuring of the manufacturing facilities at VEM motors GmbH. Already in 1993, a decision was taken aimed at creating one of the most modern factories for electric motors anywhere in Europe.

The new factory for motors from 5.5 to 315 kW was inaugurated on 27th October 1995. A floor area of 21,000 sq.m. was devoted to the manufacturing of three-phase asynchronous motors in a wide range of modifications on the basis of the most efficient production technologies available. The K20R/K21R series was launched at that same time, and experienced an extension of its output range to 500 kW when the production of motors in frame size 355 was commenced in July 1997.

Adaptability to individual applications

Comprehensive reconstruction work in Thurm led to a concentration on manufacturing for the output range 0.12 - 7.5 kW. The restructuring cleared the way for a noticeable boost to productivity and flexibility, supported by a modern logistics concept and new methods in management and production organisation. The pursued objective, to contribute to the success of our customers through partnership and cooperation, has been confirmed to the full in the response of the market. In Wernigerode alone, approx. 120,000 motors are manufactured every year. The average batch sizes lie between 4 and 9 motors, depending on the variant. In the mid-range, in particular, the trend is to adapt drives ever more specifically to the intended application. The integration of additional components, such as encoders, brakes, external ventilation and power electronics, is also becoming increasingly typical. The developments in integrated converter technologies for compact drives and the use of frequency converters with output voltages up to 690 V, for example, are now generally accepted options and call for reliable technical solutions.

VEM motors has contributed significantly to these advances, especially in the fields of variable-speed pump drives, converter-controlled crane drives and equipment for rolling mills. One very interesting example is a special motor for liquid-gas pumps, which is designed with a double bearing to handle the high axial forces and incorporates a variety of temperature monitoring sensors (Fig. 2). The product range for rolling mills has been further extended over the past few years and now goes up to frame size 400. A broad diversity of designs



Fig. 2: Special motor for liquid-gas pumps, frame size 355



Fig. 4: Thomas Gottschlich testing special motors for use in agitators, as brake motors in wind turbines or for installation onto gearboxes

Photo: Sabine Hartenstein



Fig. 1: Three-phase motor of the current K21R series (flange version)



Fig. 3: 5.80 kW roller table motor with hooded encoder and terminal box mounted at the N end

EDITORIAL

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officials - elected onto the supervisory boards on the basis of legislation on co-determination - abstain when critical resolutions are passed and happily tuck away their share with the rest of the bunch. And even if legal action is initiated, the public prosecutors strike obscure deals and the proceedings are suddenly closed against payment of a fine - possibly because a court case would reveal more details than are good for certain careers.

The cruel saying "It's always the big fish who get away" seems to be gaining in topicality.

Thousands of businessmen and entrepreneurs continue to live and work according to the traditional commercial and moral principles. Twenty or fifty rampant egomaniacs, however, are threatening to undermine the reputation of industry in Germany. It is then often precisely these characters who are courted by various political circles. I distance myself emphatically from this disgraceful game and point my finger clearly and without fear at such goings-on.

In the same way that we have chosen the right and above all sustainable sales strategy for the VEM Group, we will also ensure that our companies remain on the path of upright and fair business practice. I will be taking care personally to make sure that no-one in our company even considers joining such unworthy circles. But you can rest assured that this wave of corruption, just like the "New Economy" wave of a few years ago, will soon be dispelled by sincere and honest work, because fashions have always possessed a short half-life. The Christian virtues embodied in 10 simple commandments and the categorical imperative of the great philosopher Immanuel Kant will outlive the malignant developments which have been blown across Old Europe with the westerly winds. The Merckle family and I myself vouch for that with our names.

I thank you for the good cooperation and your commitment over the past year and look forward to our tackling new challenges together in 2007.

Yours,
R. von Rothkirch

TRADITION

Thurm to celebrate its centenary in 2008

VEM motors Thurm. VEM motors Thurm is able to look back over long traditions in the manufacturing of electric motors. In 2008, the company will be celebrating the centenary of its founding. Kurt Stephan, the son of a mill owner in Thurm, set up a new business on 20th March 1908. When his brother Alfred came of age, the newly founded K & A Stephan GmbH Thurm was entered into the local register of companies in Glauchau. The original production location in Thurm was closed in 1991. Today, the company is concentrated solely at its site in Zwickau. The name VEM motors Thurm, however, serves to keep the company history alive.

Modular VEM range expanded for further gearbox manufacturers

DEVELOPMENT Cooperation with the company Stöber solves the problem of variance with drive motors



VEM motor with brake, encoder, second shaft end and mounted external fan



VEM motor in its basic form, prepared for modular expansion

VEM motors. Geared motor manufacturers are frequently confronted with the problem of drive motor variance, which stands opposed to the demanded short delivery times. This variance may be governed, on the one hand, by the supply voltage, and thus the winding design, but at the same time also by mechanical diversity on the N side. In both cases, foundations are laid in the very early stages of manufacture, and thus predetermine the applications of the motor.

Short delivery times are naturally very difficult to achieve under such circumstances. And it is not feasible from an economic point of view for a manufacturer to maintain stocks of every conceivable form of the complete motor. To solve this dilemma, a modular motor concept has been elaborated together with STÖBER ANTRIEBSTECHNIK GmbH + Co. KG, permitting certain modifications to the motors to be made at the latest possible moment by the gearbox manufacturer.

Variance in the winding

To be able to cover as broad a voltage range as possible, the winding was designed as a varying-voltage winding. This is problematical in the case of brake motors, however, as the brake coils, when controlled via one-way or bridge rectifiers, are generally not compatible with the whole voltage range of the motors. As a solution, a special winding design for the brake was de-

veloped in cooperation between the two partners and the brake manufacturer. In conjunction with a high-speed rectifier, it permits the full voltage range of the motor (380 V 50 Hz ... to ... 480 V 60 Hz) to be handled with a single brake coil.

Variance on the N side

The motors display a common geometrical design on the N side. In this way, it becomes possible to combine the motor later with the most varied incremental and absolute-value encoders. The mounting dimensions are matched to permit modular use of parts such as motor hoods. The hood of a brake motor, for example, fits on a motor without brake, but with incremental encoder. The objective here was to be able to install the encoders under the motor hood and thus to maximise the mechanical protection for use in harsh environments.

The external fan system is similarly modular and can be added at any later time by our customer, irrespective of the individual mounting situation and without requiring mechanical modifications such as a shortening of the motor shaft. Following completion of the modular N side at STÖBER, the motors are mounted directly onto the gearbox. Thanks to modern elec-

tronics and the high resolution of today's encoders, they are suitable for use on complex machines. This ensu-

res that even servo-compatible results can be attained in respect of speed and positioning.



A VEM motor with mounted gearbox for a wood-processing machine.

Shut-off valves for wastewater and biogas plants

RENEWABLE ENERGIES Keulahütte Krauschwitz offers suitable products for new applications

Keulahütte. Increasing investments in the field of wastewater treatment and the growing significance of renewable energies present Keulahütte with further opportunities to promote sales of its existing range of gate valves.

Solutions for climate protection

The increasing share of shut-off valves sold for wastewater applications already returns some interesting figures for 2006. Active pre-sales in the long-standing markets of Central and Eastern Germany have been realised effectively. Even more interesting is the expected growth in the market for fittings for biogas plants. Renewable en-

ergies currently account for only 5% of the total energy market in Germany. Viewing the global market, however, it seems certain that oil and natural gas will become less and less able to satisfy world energy demands. For this reason, and in the interest of climate protection, biogas plants will be emerging as an ever stronger alternative in the near future. In Saxony alone, 91 biogas plants were taken into service in 2006. With a range of shut-off valves with enamelled inside surfaces and per-bunan-coated wedge, Keulahütte is in a good position to handle demand for valve fittings for biogas plants. And it goes without saying that Keulahütte possesses the necessary approvals for its biogas system valves.



The biogas co-generation plant in Zittau is equipped with gas valves from Keulahütte.

Łódź also rides with VEM

VEM Sachsenwerk. Sachsenwerk has been able to record yet another success on the highly competitive Polish tram market. Manufacturer PESA Bydgoszcz had in the past already ordered DKCBZ 0211-4FA traction motors for the public transport fleets in Elbląg and Warsaw from Sachsenwerk. Shortly before Christmas 2006, a new order was received for 40 motors for the modern low-floor tram system in Łódź. Impressive proof that our partners at PESA are happy with the quality of our products and our faithful compliance with



schedules. The trams in Elbląg are short, three-section versions, whereas Warsaw and Łódź both operate five-section trams. The drive outputs, however, are in all cases 4 x 105 kW, irrespective of the individual tram length.

Mining truck generator in field testing

VEM Sachsenwerk. Several days of field tests were completed in the Arizona desert in December 2006 and January 2007. The purpose of the tests, which were accompanied by a VEM service engineer, was to assess the performance of our DRLDZ 5010-8L traction generator on a diesel-electric mining truck under the aggravated operating conditions of a desert climate - including fast travel cycles and braking tests on washboard tracks of a severity unlikely ever to be encountered in real use. The tests were a full success and the generator handled all mechanical and electrical stresses with bravura. The next and final step on the road to series maturity is deployment in an ore or oil sand mine.

Order for roll stand with VEM machines

VEM Group. The Magnitogorsk Metallurgical Combine, one of the most important steel producers in Russia, has awarded SMS Demag an order to deliver a continuous-casting plant and a plate mill with the associated electrical equipment and automation modules. VEM Sachsenwerk is to provide two 1,250 kW edger drives and the largest twin drive which has ever been built in Europe. It is to comprise two synchronous machines with outputs of 12 MW each. The VEM package also includes 1,500 roller tables, including auxiliary drives. The deliveries will be leaving the factory in Wernigerode in 2008.

Alternative: Sensor bearings or incremental encoders?

ENGINEERING Sensor bearings for use in three-phase asynchronous motors of all sizes

VEM motors. Sensor bearings are an ideal choice wherever lighter and simpler constructions are a principal aim. As levels of automation increase, the use of such mechatronic components will become ever more widespread to handle control and monitoring tasks in frequency-controlled drives. VEM motors Thurm has also been specialising in the manufacturing of motors with sensor bearings for the past year and is already supplying such motors in large numbers.

The sensor bearings are able to determine the speed and direction of rotation and the angular acceleration of the drive. Such data are increasingly

important inputs for the open and closed-loop control systems providing for electronic plant monitoring, the signalling of maintenance intervals and automatic plant operation. Users of industrial trucks and other battery-powered vehicles are similarly demanding ever more efficient, high-performance drive systems with reduced maintenance requirements. The result of this trend is that more and more DC motors are being replaced with three-phase asynchronous motors. Sensor bearings are incorporated into traction motors and steering systems. Their signals are used by the inverters to realise optimum motor control. They

enable the speed of the motor, for example, to be held constant even under strongly fluctuating load conditions. Such considerations also play a significant role in conveyor solutions and in lifts and escalators.

The sensor units are comparable in their function to incremental encoders. The essential components are a pulse ring, a sensor ring and the electrical connection. The two Hall generators in the sensor ring are offset to each other by 90°. Their sinusoidal output signals are converted into rectangular

pulse signals in the subsequent processing electronics, whereby the functionality of the sensor bearing equates to that of an incremental encoder.

The number of pulses per revolution varies between 32 and 80, depending on the diameter of the bearing. If both the rising and falling edges are evaluated, 64 pulses provide for an angular resolution of 1.4 degrees. This resolution permits the acquisition of speeds down to almost zero and is thus suitable for a multitude of applications.



A sensor bearing (left) and a brake motor with sensor bearing mounted on the rotor

BENEFITS OF SENSOR BEARINGS

- Simple assembly of ready-to-mount units with integrated anti-rotation protection, no adjustment required
- Minimal space requirement, as the external diameter and bore correspond to a standard series 62 grooved ball bearing; only a few mm broader than an incremental encoder
- Up to 50% cost saving compared to incremental encoders
- Maintenance-free grooved ball bearings as standard bearings with lifetime lubrication, side or sealing plate on one side and gap seal on the other side
- Suitable as a locating bearing
- High measuring accuracy
- Good electromagnetic compatibility (EMC)
- Shielded version, including connecting cable
- Short-circuit-proof and protected against polarity reversal

Harting connectors in VEM motors

TECHNOLOGY VEM chooses proven connector technology

VEM motors. Motors with plug connectors are preferred in many fields of application, for example in factory automation, machine engineering, railway systems and the wind energy branch. Customers using VEM motors with plug connectors appreciate above all three key benefits: Inexpensive connection of the electric motors, the high availability of the overall plant thanks to fast replacement of the drive units and the robustness of the connectors themselves.

Harting has gathered considerable experience in the electrical connection business and thus promises a high measure of reliability. The connectors

are manufactured in various types - 3-pole, 5-pole, 7-pole and 10-pole - in either plastic or metal, with painted versions for extreme ambient conditions, e.g. for marine use or the chemicals industry.

VEM uses Harting connectors on its motors above all in Han 3A casings for installation on the terminal boxes, in Han 10 casings and for fast wiring connections with cage-clamp or crimp terminals.

Customers ordering motors with Harting connectors are asked to specify the intended field of application, the desired mechanical design and the electrical contact assignment.

USE OF HARTING CONNECTORS IN VEM MOTORS



Cage-clamp terminals

Predominantly for rail traction motors and in the pump and furnace fan industry

Benefits:

- Convenient handling
- Connections insensitive to vibration and impacts
- Constantly low voltage drop of cage-clamp terminals



Crimp connections

Predominantly on motors for wind energy applications in large numbers

Benefits:

- Constant contact resistance
- Corrosion-resistant
- Fast wiring

FAIRS

Successful start into fair year 2007

VEM-Gruppe. The new fair year has got off to a successful start for VEM. Under the banner "Shape your own future", Sachsenwerk made its second appearance at the three-day "CareerStart 2007" fair in Dresden in February. A team of instructors and apprentices handled the rush on the VEM stand, which was voted the most attractive stand at the fair by many visitors. Comprehensive information was provided on vocational training possibilities, backed up with practical demonstrations and a variety of hands-on exhibits. The objective was to give the young people an insight into technical career opportunities and to show the high quality of targeted training offered for future generations of specialists in electrical engineering.

At the opening of the fair, VEM represented the industry at a panel discussion addressing the topic: "You

can count on my help - What Saxony is doing for its trainees". Dr. Kuntze, works manager at Sachsenwerk, answered questions together with the Saxon minister-president Prof. Georg Milbradt and introduced the fair visitors to Saxon enterprises.

VEM will be present at the following fairs in 2007:

- Hanover Industrial Fair:** 16. - 20.04.2007, Hall 11, Stand B08
- Electro Moscow, Russia:** 13. - 16.06.2007
- Husum Wind:** 18. - 22.09.2007, Hall 4, Stand 4C16
- ENERGY Show, Shanghai:** 06. - 10.11.2007



Attractive eye-catcher at the "CareerStart 2007" fair in Dresden: the VEM stand

PEOPLE

Dr. Kuntze is the new works manager at Sachsenwerk

VEM Sachsenwerk. At the beginning of the year, Dr. Torsten Kuntze took up his new post of works manager at Sachsenwerk. Born in Zwickau, he obtained a first degree in electrical engineering at the Dresden University of Technology in 1991. After adding a doctorate, he moved to Siemens in 1997 to join the research team dealing with high-voltage switches. Managerial duties took him to Brazil on numerous occasions, through which he built up a good command of the Portuguese language. In 2002, he accepted new responsibilities with a Siemens holding company in Bochum, and as managing director was responsible for the manufacturing operations until accepting a move to VEM in June 2006.

Torsten Kuntze is looking forward to tackling the forthcoming challenges together with an accomplished team at Sachsenwerk. This cooperation will permit the blending of know-how gathered with a major global player with the experience of a successful SME, and he is convinced that this will further raise production efficiency. The target for 2007: "We want to achieve a noticeable increase in turnover. At the same time, our customers can continue to rely on our ultimate product quality and proven supplier reliability."



Dr. Torsten Kuntze is married with two daughters. He and his family have lived in the Dresden area since 2002.

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