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## EDITORIAL

Dear readers,

In the years following the unification of Germany, it was for Dr. Merckle a matter of heartfelt concern to participate directly in supporting industry in Eastern Germany through its transition to a market economy. Back in 1997, we found adequate technical equipment and well-trained staff, but at the same time challenging sales structures. But we were convinced that, together with our employees, we would be successful. Since 2002, VEM has been returning a profit. The employees know that their management is working to secure their existence, and that they can expect fair and understanding treatment. We have proved that VEM products rightfully hold a place on the world market. Without doubt, this is a business success story.

As entrepreneur, Dr. Merckle was prepared to put up risk capital. The employees, in return, accepted the new style of leadership. And this confidence has not been disappointed.

The VEM companies are all successful in their fields and are constantly expanding their market standing. On the basis of customer care, reliability, speed and the quality of our products, we will be able to maintain this course. Our targets for 2007 are further growth for the VEM Group and continuous healthy developments in earnings.



We will remain true to our proven, employee-oriented management style, and will strengthen and develop our business culture. Our customers will be able to rely on us in the accustomed manner, making use of our benefits of market proximity and fast response to customer needs. And our competitors can count on our remaining fair market participants.

I wish you all a peaceful Christmas and health in the coming year, and look forward to continuing of our fruitful cooperation.

Yours,  
R. von Rothkirch

# Untroubled by heat and dust

## MARKETS VEM supplies slipring motors to the worldwide cement industry

**VEM Sachsenwerk.** Temperatures of up to 55 degrees are not exactly cool. But in many cement works, it is such hot air which is used to cool the electric motors. The designers and engineers at VEM Sachsenwerk are frequently faced with challenges of this kind when asked to manufacture customer-tailored slipring-rotor machines for the cement industry. The latest in a long line of projects is for a cement works in Saudi Arabia.

With a commission from Siemens Industrial Solutions and Services (I&S), VEM is building a total of ten medium-voltage machines for a new cement line, including two drives for ball mills. The slipring motors, with an output of 8,800 kW at 1,195 rpm, are designed for a voltage of 13.8 kV. For their cooling, heat losses of up to 200 kW per motor must be dissipated to the environment via air-to-air heat exchangers.

VEM Sachsenwerk is the perfect address for such orders. After all, it possesses long traditions and many decades of experience in the manufacturing of asynchronous motors with slipring rotors. For a long time, this motor type seemed to have fallen out of favour on the market, until the growth of the



The booming economy in Saudi Arabia is demanding enormous quantities of cement. This new production line has been designed to deliver some 7,000 tonnes of clinker per day.

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# Modern drive systems for optimum energy consumption

## EVENTS 5th Technical Conference of the VEM Group in Wernigerode

**VEM Group.** According to figures collected by the German Electrical and Electronic Manufacturers' Association (ZVEI), two-thirds of the worldwide



Photos: Karin Wagner

energy consumption in industry is accounted for by electric drives. Energy-efficient drive technology could enable 15% savings in electricity, or in other words, some 27.5 billion kWh. Around four-fifths of this amount could be contributed by electronic speed control, whereby the drives for pumps, fans and other systems are supplied only with the energy they actually require. Energy-saving motors would be able to add a further one-fifth. As power consumption represents the lion's share of the incurred costs for many drives, there is here considerable potential for cost savings. Many users, however, are still not aware of this fact.

All the more reason for the VEM Group to choose electric drives as the central topic of its 5th Technical Conference. VEM users, researchers and manufac-

turers were invited to this traditional gathering in Wernigerode on 12th and 13th September 2006. More than 200 drive specialists from all over Europe, the USA and Asia took up the invitation. Under the banner "Electric Drives for Industrial Applications - Benefits and Requirements", 20 speakers from 15 countries presented the latest research results, developments and trends in drive engineering, control systems and materials.

With variable-speed drive systems and new drive technologies, it would be possible to lower electricity consumption, for which the speakers offered solution approaches at various levels. The new European Ecodesign Directive on Energy-Using Products was also discussed. Prof. Anibal de Almeida

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The guests were treated to presentations by 20 speakers from 15 different countries.

# Grinding centres replace manual cleaning

**ENGINEERING** New investment raises company productivity

**Keulahütte.** The cleaning shop is one of the most problematical departments in any foundry. The physical strains of manual cleaning, in particular, paired with the mental stress of final quality control, often result in personnel shortages due to increased sickness rates. The search for new employees is similarly often difficult, as an absolutely healthy body and

marked physical capabilities are fundamental necessities. Against this background, Keulahütte addressed the question as to whether and to what extent an intelligent cleaning system could reduce the heavy manual work and boost the hourly cleaning output. The latter aspect is especially urgent, as the dramatically increased prices

for gas and electricity, for example, can only be compensated by raising productivity and thus lowering the unit costs. Following comprehensive testing at the Scottish company P.S. Auto Grinding, Keulahütte decided to purchase two high-performance series 400 Barinder/Koyama foundry cleaning systems in March 2006. The machines were

erected and taken into operation in the record time of just four months. The grinding centres are used for pressure pipe castings, soft-sealing gate valves and selected customer castings up to a casting weight of 27 kg and a maximum diagonal of 720 mm. Each part possesses its own mounting fixture in accordance with the individual casting configuration.

A special diamond-coated stainless steel grinding wheel with a diameter of 355 mm removes the mould joint and core marking flash under program control. Difficult or small casting elements can be cleaned with a programmable grinding arm carrying special grinding wheels with diameters between 81.5 and 101.5 mm. The simultaneous operation of two grinding centres with just a single operator has to date achieved an average reduction in the grinding time of approx. 52%. An ultramodern filter system removes the dust from an air volume of 6,000 m<sup>3</sup> per hour, guaranteeing purity values which permit the air to be returned to the hall.

The priority task is now to produce fixtures and programs for on average three new casting types each week, whereby full three-shift operation will be secured at the latest from January 2007. Another objective is to prepare the installation of further grinding centres for larger part diagonals and weights up to 70 kg, so as to be able to realise CNC cleaning also for the hydrant product range in the future.

The two high-performance foundry cleaning systems were taken into operation in the record time of four months.



Photo: Lito Müller

## PROJECT

### Sub-supplier for SO<sub>2</sub> fans

**VEM Sachsenwerk.** The VEM Group has supplied 6 kV drives for renewal of the process fans in the sulphuric acid cracking plant at Degussa-Röhm in Worms. General contractor VSK-Technik Kübler GmbH found the strong partner it was searching for in Dresden. The replacement of two SO<sub>2</sub> fan drives called for 6 kV slipring motors for 2,050 kW and



Slipring motor for SO<sub>2</sub> fan drives, type DBKAJ 6321-4WF, 2050 kW, 6 kV

1,500 rpm with modified oil starters. The motors feature a brush lifter with short-circuiter controlled by way of a Simatic S7 200, which is also responsible for controlling the auxiliary systems. The drive unit comprising motor and oil starter weighs 14,000 kg. A system test for the slipring motor, the starter and the assigned control system was performed at Sachsenwerk before delivery. The overall project, which included further squirrel-cage motors and converter-fed motors for cooling and combustion gas fans, was realised in just 18 months.

## PEOPLE

### Dieter Bellstedt appointed managing director in Thurm

**VEM motors Thurm.** Dieter Bellstedt, previously works manager of VEM motors Thurm, was appointed managing director on 9th May this year.



Electronics engineer Dieter Bellstedt has worked for VEM since 1st October 1973.

This decision honours many years of outstanding commitment to the company and ensures continuity within the management. At the same time, it stands for the declared strategy of entrusting management positions exclusively to persons whose proven capabilities, honesty and reliability have enabled them to become role models for their employees.

## Untroubled by heat and dust

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wind energy branch and – over the past four years or so – a worldwide boom in the cement industry heralded a renaissance for slipring motors. Especially in regions enjoying accelerated industrial development, such as the Middle East and Asia, there is currently enormous demand for the building material cement. Building materials are similarly in demand for the reconstruction of destroyed infrastructure following natural disasters such as tsunamis or hurricanes. More than a dozen new cement works are presently under construction in the USA alone.

Robust slipring motors are particularly suited for applications in the cement industry. They are used above all as drives for mills and furnaces, and must there cope not only with tough mechanical conditions, but also with dust and high temperatures.

VEM Sachsenwerk designed the medium-voltage machines specifically for such an environment. They are cooled exclusively with air, as water is naturally out of the question as a coolant in a cement works, and in many regions is not available in sufficient quantities in any case. To prevent cement dust penetrating into the motor, each drive is equipped with its own closed cooling system in the form of an air-to-air heat exchanger. These heat exchangers are similarly designed and manufactured in Dresden. The special starters of the slipring motors are also suitable to handle difficult starting conditions – an important fea-

ture where the power supply at the installation site is not as stable as we know it in Western Europe. Dedicated know-how has enabled VEM Sachsenwerk to develop into Germany's leading manufacturer of slipring-motor machines. The drives cover an out-

put range from 200 kW to 14,000 kW and are in use around the world in the most varied branches. For the cement industry, Sachsenwerk supplies motors with outputs up to 10 MW, for example as drives for belt conveyors, mills and crushers.

### The most desirable are the first to go



VEM drives for the cement industry Made in Germany – coveted worldwide

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## NEWS

### New entrance and new address

**Keulahütte.** The process of restructuring in Krauschwitz recorded a special highlight in the summer of this year with the opening of new access to the company premises at Geschwister-Scholl-Strasse 15 on 1st August. Customers and delivery drivers can now use a much more convenient entrance, away from the crossroads on the busy B 115 road.



At the same time, a new staff car park has been established on the company grounds – directly beside the entrance. The employees are naturally delighted with the shorter walk to work and with the safe parking for their vehicles.

Photo: Lito Müller

# Guarantee for high reliability

For many years, the wind power branch has relied on generators, auxiliary drives and castings from the VEM Group

**VEM Group.** Wind power has been one of the fast-growing areas of the power generation sector for a number of years. A capacity of over 40,000 MW was already installed worldwide up to 2003 alone. At that time, the installed output in Europe exceeded 29,000 MW. Since 2004, Germany has been the country with the greatest nominal installed output in the world.

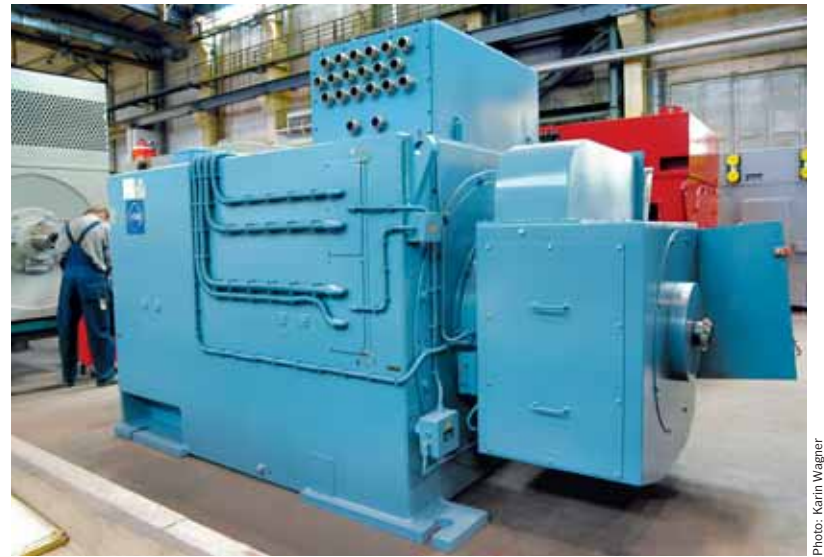
The VEM Group is one of the prominent names on the list of companies which have served the power sector as reliable and strong partners. This role is well illustrated with three examples - the development and manufacturing of the world's largest double-fed wind power generator with an output of 5.4 MW and the four motor-generator sets for Europe's lar-

gest pumped-storage power station in Goldisthal in Thuringia with a total output of 1,060 MW, all from VEM in Dresden, and electric motors from VEM motors in Wernigerode and Thurm.

The development and manufacturing of wind power generators, in particular, benefits from previous industrial applications and the decades of experience in the designing of electric machines which has been gathered at VEM in Dresden. With a range of double-fed machines as wind power generators, VEM offers its customers tailored solutions. The close cooperation with leading manufacturers of frequency converters, furthermore, produces optimum solutions for every turbine or wind farm configuration. All the development depart-

ments work together closely with partners in science and research. On the basis of the standard components of VEM machines, the engineering teams have been elaborating customer-specific wind power generators for over ten years now. They are counted among the technology leaders on the market and have contributed significantly to the worldwide yardsticks for new generations of wind turbine systems.

Low-voltage machines for hydraulic, oil and cooling systems are equally established elements of the VEM product range for the wind power branch. And we must not forget, finally, the machine-moulded castings from Keulahütte Krauschwitz, which are also to be found in countless installations for alternative power generation.



Wind power generator with an output of 5.4 MW for one of the largest offshore wind turbines in the world

Photo: Karin Wagner

## EXAMPLES Wind power generators from Sachsenwerk

On the globally expanding market for wind turbines, VEM Sachsenwerk has emerged as one of the leading manufacturers, particularly in the higher output ranges - both for double-fed slipring generators and for modern synchronous generators.

Generator design takes into account not only the customer specifications and relevant general regulations, but also the latest independent results from the research being conducted at universities and colleges. It has been thanks to cooperation in the SIMU-

Wind working group with the TU Dresden and RWTH Aachen, for example, that VEM today possesses considerably greater know-how regarding the mechanical demands placed on wind turbines in extreme situations. This know-how can be built into the designs from the very beginning and further raises the availability of the generators. In this way, VEM is able to serve its customers as an expert with the necessary specific competence to handle difficult drive applications, rather than as a mere supplier

of components. This applies both to generators and to the designing of motors for the auxiliary drives.

Irrespective of their principle, the wind power generators are characterised by a high power/size ratio based on electromagnetic optimisation and a compact form factor. Further technical benefits include:

- Use of the VPI technology as a guarantee for the constantly high dielectric strength of the preformed coils
- Suitability of the rotor winding of double-fed generators for medium voltages and special designs for high rates of voltage rise
- The main sliprings and the sliprings for earthing systems are always manufactured from stainless steel and can thus be incorporated without problems into coastal or offshore installations. Redundant earthing systems in combination with specially developed bearing insulation, furthermore, ensure reliable handling of converter operation. The use of modern calculation programs enables generators to be designed for:
- optimum efficiency also under partial load, as well as low-noise operation

- special location conditions (weak grids, reactive power, e.on and other "grid codes")
- load and bearing endurance ratings as demanded by certification bodies such as Germanischer Lloyd, Risö or TÜV
- adaptation to the dimensions of a given nacelle design with 3D CAD tools

At the same time, the manufacturing depth at VEM permits fast and flexible response to customer wishes.

### Competence to meet the highest demands

In both European and international competition, our company group will in future, too, remain true to the successful strategy "Quality - a VEM trademark".

VEM possesses extensive experience with regard to applications which must guarantee high levels of availability, e.g. drives for installation aboard ships or for primary industry. Special attention is already paid to service-friendly design at the initial development stage. It goes without saying that the user receives product-specific operating and maintenance manuals for the supplied motors and

generators. They are geared directly to the actual demands placed on wind power generators and - together with targeted service training seminars for operators and system manufacturers - help to avoid downtime and thus to secure the greatest possible availability, as a prerequisite for economically efficient operation. This includes, for example, pointers to prevent incorrect alignment when installing the generators, notes on proper maintenance and the observing of lubrication intervals, and information on the special features of the brush-slipring system.

This all contributes to our key objective of ensuring that VEM generators from Sachsenwerk reliably fulfil both customer-specific requirements and quality demands. In-house test stands provide the facilities to verify the rightly expected quality of our wind power generators. High-tech equipment and experienced, qualified staff guarantee that the test procedures are performed in conformance with the relevant standards. Our company is certified to DIN EN ISO 9001 and possesses considerable experience with the test requirements of the most varied acceptance organisations at home and abroad.

### Delivery range for wind power generators

- Asynchronous squirrel-cage machines
- Double-fed asynchronous machines
- Synchronous generators (electrically excited or permanent-field)
- Synchronous machines in designs for gearless or single-stage gearing solutions - upon request

Output range	1 to 6 MW
Voltage range	690 V to 12 kV
Frequencies	50/60 Hz or converter control
Cooling	Air-to-water, air-to-air

## EXAMPLES Auxiliary drives from VEM motors

As a full-liner for polyphase machines, VEM supplies not only wind power generators but also low-voltage machines for use in wind turbine installations. VEM low-voltage machines are characterised by extraordinary reliability

in operation, efficiency and a long service life. Their adaptability destines VEM drives for universal use and constantly opens up new fields of application, among them increasingly applications in the wind energy

branch. In such fields, drive systems are complemented with precision reduction gearing meeting the highest standards with regard to torque and running speed. In combination with such high-performance reduction gearing, VEM motors has for several years supplied three-phase asynchronous brake motors as setting drives for azimuth control in wind turbines. The task of the electric azimuth drives is to turn the nacelle into an optimum position and then to hold this orientation. Through perfect matching of the system components, it is possible to track the slightest change in wind direction with absolute precision. The demands to be met by our brake motors include special stalling and starting torques. They are fitted with double-disc brakes acting as holding brakes. In the past business year, VEM motors Thurm supplied around 2,000 brake motors for yaw drives to Nabtesco, one of the world's major manufacturers of cycloidal precision

gearing. Four gear systems turn the wind turbine nacelle at a gearbox running speed of 0.5 rpm. In addition, a special paint finish was necessary, as some of these drives are used in off-

shore versions in the USA. Wind farms incorporating such brake motors are also to be found in Europe, however, and this year also saw first orders of brake motors for wind farms in Canada.



Above: The nacelle is turned with four drives. Right: B21R 112 MX 6 with cycloidal precision gearing.



Photo and illustration: Nabtesco

### Castings for wind power applications

Keulahütte GmbH produces machine-moulded castings in high-quality ductile iron for the wind power generation sector. They are used predominantly for safety-relevant components such as the rotor and azimuth brakes, but also in the slewing gears. The weights of the castings vary between 10 and 100 kg. Disc brakes serve to retard the rotor and to secure the slewing tower head of the wind turbine. Braking forces up to 430 kN are handled. For the slewing gears of wind turbines, Keulahütte manu-

factures output shaft gland housings for the most varied purposes. These compact, high-strength castings take up highly efficient gearing systems engineered for a long service life and simple maintenance. For the customer, it is decisive that the machine-moulded castings are not only of the corresponding quality, but also available at very short notice. The two-shift utilisation of our moulding plant, which commenced last September, establishes ideal conditions for this flexibility.

# Electric drives: Knowledge,

## TECHNICAL CONFERENCE

On these two pages we would like to recap some of the

**VEM Group.** “Electric drives for industrial applications – Benefits and requirements for motor/converter and motor/starter combinations under the aspect of global application” – that was the full wording of the banner spanning the presentations at the 5th Technical Conference in Wernigerode in September (see also page 1). Topics concerning modern drive systems with energy-saving potential stood at the focus of interest. The speakers presented their latest findings and developments and indicated corresponding solution approaches, together contributing decisively to the high level of this technical and scientific discourse. On these two pages, we would like to offer you an overview of selected contributions, albeit naturally in very abridged form due to the limited space. The full texts of the presentations, however, can be obtained by contacting the editorial office of “VEM Impulse”.

### Cost savings through energy efficiency

Under the title “European Ecodesign Directive on Energy-Using Products” (EuPS), the European Union is currently preparing a new directive aimed at reducing the energy consumption of electrically driven products. In his opening presentation, Prof. **Anibal de Almeida** from the renowned Portuguese University of Coimbra reviewed the status of the work in the field of electric motors.

The initial objective of the EU project is to analyse technical and economic criteria in the context of ecological aspects, in other words energy savings. To this end, a representative range of motors from 1 to 150 kW, pumps, fans and compressors is under scrutiny. The results are expected to form the basis for concrete EU guidelines, which can then take effect either as voluntary undertakings or in statutory regulations. This is a matter for motor manufacturers and

users alike, and will influence both the European and global markets. Prof. de Almeida outlined the energy and cost-saving potentials and explained why so few users are presently taking advantage of the opportunities. Many are simply unaware of the extent of possible savings. Most attention is paid to the purchase price, even though energy consumption often accounts for 80 per cent of the total costs of a motor. If life cycle costs are considered, it immediately becomes evident that investments in energy-efficient drive systems soon pay off for the user. The prerequisite is a precise analysis and optimisation of all relevant factors, such as technical conditions, life cycle costs and the best available technology.

One obstacle in the way of a more widespread use of energy-saving motors is the predominant distribution structure. Only 10 per cent of the drives are supplied directly to the final user; the remaining 90 per cent are sold through OEMs and dealers for whom the lower power consumption brings no direct benefits.

Alongside scenarios for energy saving, Prof. de Almeida presented an overview of the existing regulations, environmental standards and labelling requirements both within and outside the European Union. Their sheer number illustrated clearly that – especially in the interests of the manufacturers – commonly applicable stipulations are urgently necessary.

### Permanent-field synchronous torque motors

The advantages of permanently excited synchronous torque motors were presented by **Dirk Seehase** and Dr.



**Eckehard Bunzel** (photo) from VEM motors. In modern drive applications, converter-controlled three-phase motors are gradually ousting classic DC drives. It

was the cost developments in converter technology and the availability of ever smaller components for power electronics which initiated this trend.

At the same time, however, the use of converter technology in conjunction with modern three-phase motors offers the user concrete benefits. These include, to name but a few: the outstanding price/performance ratio, low maintenance, robust design and a long service life, simple modification, modular systems, and the good interchangeability of products from different manufacturers.

Deficits or problems are encountered at slow speeds, in loss dissipation from the rotor and in the limited positioning accuracy. Servo systems on the basis of permanent-field synchronous motors overcome these disadvantages and offer further benefits, e.g. high dynamic performance, low moment of inertia, realisation of high torques, good overload capabilities, highly constant torque, broad speed range, high levels of efficiency, and speed/positioning accuracy. The relatively high system costs, on the other hand, are still an impediment.

One alternative here is a combination of the technologies, a torque motor based on a low-speed, permanent-field synchronous machine, which relies essentially on the classic components of three-phase asynchronous motors. The air-gap field is excited not via the stator winding, as with a low-voltage asynchronous machine, but instead by way of permanent magnets mounted on the rotor surface.

This design permits a considerably higher torque for a given size of motor. The use of high-quality permanent magnets eliminates the need for rotor windings and brushes, as are otherwise used for the excitation of synchronous machines. In accordance with the new basic concept, the dressed die-cast rotor bodies of the basic asynchronous motors are fitted with shell-type surface magnets. These magnets feature an identical inner and outer radius and diametral magnetisation. In their axial direction, the pole magnets comprise several single magnets in a staggered arrangement.

This achieves a skewing effect, which in turn exerts a dominating influence on the static torque in idling and under load. The optimum values for the radial width of the magnet shells and the offsets between the individual magnets are determined by way of FEM variant calculations.

The target functions of the optimisation were here

- the idling static torque
- the static torque under load and sinusoidal current
- the magnitude of the field and voltage harmonics of the 5th and 7th order

The FEM calculations were performed for different pole covers and magnet skews. The die-cast body represents a mechanically highly stable and favourably priced system base. In conjunction with a classic stator construction, this produces a robust, low-maintenance design.

At the same time, use can be made of the full mechanical range of the basic three-phase asynchronous motor series. Different cooling systems can be chosen to match the field of application, i.e. the motors can be configured as IC 410 (non-ventilated), IC 411 (self-ventilated), IC 416 (forced-ventilated) or IC 31W (water-cooled) versions. The principal cooling vari-

ants, however, are forced ventilation and water cooling, as these offer the best prerequisites for heat dissipation in operation at low speeds.

The highest torques are achieved with water cooling, as the low rotor losses and ideal stator loss dissipation constitute ideal cooling conditions.

The attainable torque is greater than that of a standard asynchronous motor by the factor 3. Possible overloading is defined by the fundamental-wave terminal voltage of the motor dimensioning and the maximum possible output voltage governed by the converter, and lies between 1.3 and 1.6 as standard.

The motors are naturally suitable exclusively for converter-fed operation, and are intended for use as replacements for DC motors and in gearing applications.

This enhances the possible control accuracy and consequently also system reliability. Ideal fields of application are seen in the paper industry, as well as in plastics (injection moulding machines, extruders) and marine drives.

### Asynchronous motors with slipring rotors

The static and dynamic processes on asynchronous motors with slipring rotors and starters were the topic of



the presentation given by **Ulrich Winter** from VEM Sachsenwerk. High-voltage slipring machines as drives for high-power equipment are widely proven,

and despite constantly increasing converter outputs still maintain a rightful presence for special drive tasks. They represent favourably priced and tested solutions, and are chosen frequently for use on weak grids or in applications with high counter-torques or moments of inertia.

Operation reveals a number of special points, particularly in case of high-output motors. Ulrich Winter addressed some of these points in his presentation. The key aspects were:

1. The acceleration of slipring motors with step starters
2. The acceleration of slipring motors with liquid starters
3. Extraordinary operating states in continuous operation with slipring motors.

A separate appraisal was made of the processes in case of automatic system switching or recovery and single-phase interruptions in the rotor circuit.

For all the key topics, special attention was paid to the dynamic processes and their effects for the subsequent operating behaviour of the motors.

### Servo drive technology of the latest generation

**Steffen Winkler**, the branch sales head for food and packaging at Bosch Rexroth AG, presented an overview of IndraDrive Mi, a distributed servo drive technology of the latest generation.

He explained in detail how this technology realises a completely new design principle. The motor housing



serves as a heat sink for the controller, which is mounted on the motor and thus reduces disturbance of the design contour to a minimum. The result: Up to 30

per cent reduction in size compared to other integrated solutions where the electronics are mounted behind the motor, and over 50 per cent compared to classic servo drives comprising a separate motor and controller. Space requirements and heat losses in the switch cabinet are reduced dramatically. Thanks to the new design principle, furthermore, it is possible to eliminate all wear-prone components such as fans, electrolytic capacitors and relays.

IndraDrive Mi also provides for significant simplification of the application wiring. A single cable suffices for the power supply and control communication. If several IndraDrive Mi units are installed in series, the wiring outlay is reduced further still. Additional drives can be added flexibly as need arises, without requiring changes at the switch cabinet. This innovative solution thus holds considerable potential for cost savings.

IndraDrive Mi combines ultimate power density with comprehensive functionality and is fully compatible with the rest of the IndraDrive Mi family. Like all IndraDrive models, the Mi servo drives incorporate over 100 technology functions, including also the integrated Motion Logic system conforming to IEC 61131-3. This opens up whole new avenues for decentralised automation. The first results of field tests conducted with different machine manufacturers indicate that IndraDrive Mi is also able to deliver full performance and functionality in continuous use in harsh production environments.

### Frequency converters for metal-industry applications

Managing director **Alfred Stobbe** from Convertteam GmbH delved into the subject of frequency converters for metal-industry applications.

He reported first on the business field and focus of his company, before moving on to a survey of the CVT market position regarding electrical equipment in the metal industry. In doing so, he also addressed the demands to be met by variable-speed drive technology for new construction or modernisation projects, as well as frequency converter configurations for single- and multiple-motor drives, backing up his words with selected project examples.

Of particular interest to the listeners were the optimisation criteria for the drive package frequency converter and motors.



After an intensive series of presentations, the conference participants enjoyed a well-earned break.

# ideas and visions

presentations given at the 5th Technical Conference in Wernigerode



The agenda for the two days of the conference also planned ample time for contacts between customers and partners.

To complete his presentation, Alfred Stobbe illustrated the cooperation with VEM by way of a number of reference installations.

## Servo drives with concentrated windings

Dr. **Martin Doppelbauer** from SEW Eurodrive GmbH & Co. introduced the participants to new developments and details surrounding servo drives with concentrated windings. Three-phase windings for synchronous and asynchronous motors are usually realised with distributed windings, i.e. the outward and return conductors of a coil lie several slots apart. The coil width is here approximate to the pole width, whereby it is possible to approach the desired sinusoidal field pattern in the air gap optimally and to minimise parasitic harmonic fields.

Disadvantageous, however, is the outlay for the winding overhang. The relatively wide spacing of the two coil sides mean that there are large distances to be bridged. In addition, there are many coils immediately alongside each other in a very confined space, which calls for complex insulation. The manufacturing of a

distributed winding is involved and requires not only a greater materials input, but also considerable manual work.

By contrast, the two sides of the coils of a concentrated winding lie in directly neighbouring slots, i.e. each coil encloses only a single tooth. The winding overhang is thus very small, and there is no extra outlay for insulation, forming and bandaging. The winding is favourable in price and can be manufactured practically without manual intervention.

The essential disadvantage of the concentrated winding, which was already invented and patented by AEG in Berlin over 100 years ago, is to be seen in the field pattern in the air gap. Many frequencies occur in the m.m.f. curve and there are usually several dominant fields. It is thus not possible to use this winding in classic induction motors with cage rotors, because all the fields present would excite the rotor and would produce serious vibration and noise. Instead, a rotor arrangement must be chosen wherein the desired number of poles is inherent. Furthermore, the number of usable pole pairs of a concentrated winding increases with the number of teeth, and thus with the motor diameter. Typical applications, according to Dr. Doppelbauer, are small servo motors with permanent-field rotors and slow-running high-torque drives.

The presentation provided an overview of the possible and sensible applications for concentrated wind-

ings. Restrictions of choice with regard to the attainable current utilisation (winding factor), noise and vibration, as well as heating of the magnets through eddy currents, were discussed. As a conclusion, Dr. Doppelbauer presented a highly automated manufacturing line for the concentrated windings of small servo motors (approx. 0.5 to 5 Nm).

## End corona shielding in high-voltage machines

The performance of end corona shielding in converter-fed high-voltage machines was the topic presented by



Dr. **Frieder Kielmann** (photo) from VEM Sachsenwerk GmbH and Dr. **Jochim Speck** from the Dresden University of Technology. The effects of the

increased electrical stresses arising in converter-fed operation on the performance of end corona shielding are currently a subject of worldwide investigation. The objectives are to clarify whether the long-established rating rules for sine-wave operation can remain applicable also for the changed conditions, to assess the modifications which may be necessary, and to determine how the performance of the end corona shielding can be veri-

fied within the framework of the performance testing for the complete insulation system. It is hoped that these studies will confirm that surface discharges are also reliably prevented by potential control at the slot end in converter-fed operation, without at the same time resulting in impermissible warming in the area of the end corona shielding.

The presentation expanded upon existing study results by embracing technological variants for winding manufacture. At the same time, the calculation models for voltage distribution and the additional losses were simplified. Overall the speakers were able to demonstrate that the usual corona shielding designs employed by VEM Sachsenwerk provide for adequate control and that hot-spot temperatures lie within the permissible range.

## Alternating torque excitation in steady operation

The subject considered by Prof. **Bernd Ponick** from the University of Hanover was alternating torque excitation in the steady operation of drive systems.

As electromechanical energy converters, electric motors represent the link between the driven machine on the one hand and the energy supply - converter or power mains - on the other.

The mechanical drive train is a system capable of torsional oscillation and is thus inherently sensitive

to alternating torque excitation. For this reason, it must be dimensioned in accordance with the torque peaks to be expected in fault situations or during regular starting. In the case of converter-fed drives, additional importance is to be attached to determination of the alternating torques arising in steady operation.

After all, the natural frequencies of the torsion and the excitation frequencies must not be allowed to coincide over the whole speed adjustment range. It must be noted, however, that alternating torque excitation may also arise from the machine geometry, even in the case of a sinusoidal three-phase supply system.

Prof. Ponick explained how the torque arises in electric machines and spotlighted the various electromagnetic excitation mechanisms of alternating torques. In this context, he discussed both the excitation resulting from the power supply via a frequency converter and that



which ensues solely from the chosen geometry (number of slots, winding design, etc.). By presenting selected examples and with illustrative animations, he described these mechanisms and expounded the differences between mains-fed and converter-fed motors.



The participants also had the opportunity to visit this year's Sachsen-Anhalt Horticultural Show, the grounds of which were just a stone's throw from VEM motors.

## Modern drive systems for optimum energy consumption



continued from page 1

from the University of Coimbra (Portugal) reported on the current status of the preparations, which have been placed under his auspices.

Tony Martin, VEM representative from Singapore, had the longest journey behind him. After the two days of the conference, however, he was convinced: "The journey was well worth it. The topics which were discussed here

are also significant for the market in Southeast Asia." But it is not only the quality of the presentations which draws participants to the Technical Conference. No less important is the opportunity to meet customers and partners. For Tony Martin, too, "networking" was one of the most valuable aspects of his trip to Wernigerode. When Jürgen Sander, managing director of VEM motors, emphasised the high technical level of the conference in his closing remarks, his auditors were unanimous in their agreement.

And many of the participants already noted down the scheduled dates for the 6th Technical Conference in 2007.

The 6th VEM Technical Conference is already planned to take place in Wernigerode on 4th and 5th September 2007.

The Technical Conference is held annually in the Kultur & Kongresshotel in Wernigerode.

# VEM frequency-controlled drives for working roller tables

**PARTNER** Modern gearbox motor concept implemented, including delivery and installation

**VEM motors.** One of the construction materials in greatest demand in the market today is steel. Its flexibility and tailor-made product characteristics make steel a high-end, valuable quality product which is ubiquitous in all industries, e.g., in building and port construction.

The company Peiner Träger GmbH produces a variety of sectional steel types, e.g., European beams, sheet pile and special sections as well as the world-famous Peine beam in great demand by industry. To meet the quality requirements and supply the large market for steel products, Peine Träger started refurbishing their STS heavy beam rolling train as early as in 1985. Latest concast rolling mill equipment is now being phased in and replaces the old machines.

The refurbishment project of the finishing group of stands of the heavy beam train was completed in summer 2006. As part of the project, the end roller bed was extended from 105 to 140 m. This roller bed moves the stock during rolling, transports it to the saw cutter and positions it for cutting.

First calculations were made and the design of the new drive units developed by VEM motors under the project management of E. G. Klose from the partner firm of KLOSE ENGINEERING GMBH (KE) as early as in 2004. At that time, the available DC gearbox motors were to be replaced with 3-phase versions for higher efficiency.

This also required replacement of the DC feeding system and installation of a frequency converter based system. In two years of close cooperation with Peiner Träger, VEM, in tandem with KE, developed a modern gearbox motor concept that fitted the space available on site and met the customer's high expectations.

In view of the high level of commitment during the preparation of the design of the machines and the competence in electrical drive systems, VEM motors, in February 2006, won an order for the manufacturing and installation of these gearbox roller bed motors from the electrical contractor, BEA Elektrotechnik und Automation GmbH.

Within 5 months, VEM motors shipped to the steel and rolling mill in Peine 66 drive units, 6- and 8-pole ARC series roller bed motors of 11.4 and 19.1 kW, at 1- and 2-step gearboxes with clutches to the roller bed rolls, whose design did not require changing the available fitting dimensions. The motors were installed at the rolling mill train under the supervision of VEM personnel in August. Work was completed and the installed gear-box roller beds handed over to Peine Träger GmbH by mid-September 2006. They will now have to pass the crucial test under complicated conditions and stand out as landmarks of high quality, safety and know-how of the VEM label.

The expected lower level of maintenance of these motors, the higher transport speeds and the shorter lengths of the roller bed groups will work out as important benefits for our customers and also for their buyers.



Top: VEM gearbox motor ready for shipment  
Bottom: Fully installed drives of the beam rolling train

Photos: E. G. Klose

## VEM Sachsenwerk successful at InnoTrans 2006

**VEM Sachsenwerk.** Sachsenwerk had their latest traction equipment for different types of traction machines on show at InnoTrans 2006, the global leader among railway equipment exhibitions, in Berlin in September. The quality and performance of the products from the Dresden-based supplier attracted a large number of customers and prospective buyers. This was the most successful event for more than a decade. The transportation experts from Sachsenwerk renewed existing and made many new contacts and also discussed a number of concrete projects with their opposite numbers. This resulted in several orders, some of which have been received or are expected to come soon. These include four prototypes of VEM traction motors from Monorail, which will also be sold to Indonesia in future.



EN95 for Warsaw's suburban train system WKD

## Technical mastermind of the factory

**PERSONS** Udo Müller: Quality manager at Keulahütte Krauschwitz

**Keulahütte.** Metal dominated Udo Müller's (43) work for a lifetime. A trained foundryman, he studied the difficult discipline of metallurgy in Moscow and thereby laid the foundation stone for his varied professional activities. He found his first job with a big foundry shop in Leipzig, then he moved to Lusatia for family reasons. When he started work at Keulahütte Krauschwitz in 1989, the first thing to do was to introduce computers and computing in all departments of the foundry. As head of department, he has been responsible for quality since the end of 1993. "Technical know-how, a capacity for understanding and a thick skin are most important in my job", Udo Müller says. He has customer exposure every day and handles all complaints. Flawless quality is not only the expectation of the quality department, it is what customers expect, the graduated engineer is convinced. This is why he likes working in a factory in which quality affects all processes in production. The shallow management structure of the Krauschwitz-based VEM firm and a team well-rehearsed for many years are good preconditions for this.

Together with five employees, Udo Müller watches over the quality of the products. This is only one of his duties, however. He also improves the quality management in the factory. He holds all required certifications, such as ISO 9001 or the GSK quality label, and certifications, e.g., for shipbuilding and fittings. At Keulahütte, he is also responsible for design, product and process development. He was instrumental to the introduction of the new epoxy resin powder coating process and the modification of a new fluidized-bed coating process to suit

the conditions at Keulahütte. As an expert, he also develops ideas to improve the quality of castings. Years ago, he suggested to make the corrosion-susceptible control head of hydrants of resistant aluminum. This underlines the pioneering role of Keulahütte, a pacemaker in hydrant development for many years, in the industry.

Uwe Müller is member of several technical standardization committees, where he applies his profound expertise to improving quality in all fields. In this capacity he contributes the know-how of the Krauschwitz VEM facility to the improvement of European norms and standards. Udo Müller tackles all tasks with energy and

stamina, sometimes also with impatience. This earned him the respectful title of "technical mastermind of Keulahütte".

The head of quality attentively follows reports in the media and the technical journals and takes note of all changes in industry. Foundries are in a heyday period today. With new equipment and streamlined technological processes, the firm has made necessary arrangements for this. This makes him optimistic. He hopes that the firm will be able to improve profitability despite the rising prices of materials, including raw materials. "I will make my contribution to this challenging target", Udo Müller is sure.



Udo Müller is married and has a daughter. He likes cycling, photography and editing photos and videos at the computer.

Photo: Udo Müller

## PARTNER

### Market activities for gearbox motors with Rexnord

**VEM motors.** This year, further progress in the successful marketing of built-in gearbox motors complying with the special requirements of the industry has also



Bevel gear unit with built-on brake motor type B21R 100 L 4

been made by the Dutch Rexnord Group, specialist for integrated solutions for mechanical drive systems. Several modifications developed together with customers open up new applications throughout the world. Both firms apply each other's skills and know-how to make the products even more attractive for the market. Suffice it to mention the cooperation agreement concluded between the two companies for rolling mill equipment or the automotive applications. Further information will be available from a flyer to be published by the two companies soon.

Photo: Sabine Hartenstein

## DEVELOPMENT

### Eco-friendly electric motor vehicle launched

**VEM motors.** An electric motor powered car named Wizard has been developed in the Saxon town of Meerane. Made by ECM Electric Car Manufacture, a firm



The electric motor for this modern vehicle comes from VEM motors Thurm.

founded in 2004, the car is powered by a 1.4 kW electric motor produced by VEM. The environmentally sound open car will preferably be used by elderly people on shopping spree, for re-convalescing patients after dismissal from hospital, and for logistics. At maximum 25 km/h speed, the car is licensed as motor vehicle. The two batteries need a recharge after about 80 km distance. Series production of the motor vehicle started at the end of May. Totally 100 such cars will have been made by the end of the year.

Photo: ECM

# VEM Slovakia celebrates anniversary

VEM ACTIVE

VEM INTERNATIONAL

Subsidiary in Piešťany produces windings for VEM motors

**VEM motors.** For the last 150 years Piešťany has been famous as a spa. For ten years ties have been close between that Slovakian town and the factories of VEM motors. In 1996, a hall was built in an industrial estate on the fringe of the town where the subsidiary company, VEM Slovakia s.r.o., produces windings for electric motors made at Wernigerode and Thurm. Exactly ten years later, on 4th

September 2006, the employees of that Slovakian firm celebrated the anniversary with a festive reception which was also attended by the shareholder family Dr. Merckle. Rudolf Beutner, work manager of VEM motors, was part of the team from the inception of the Slovakian subsidiary. He had managed the construction project for one year, recruited the workforce and took care that working conditions were acceptable. His knowledge of the Slovakian language comes in very helpful today.

## The quality meets expectations of VEM motors

VEM in Piešťany now has a workforce of about 220, forty of whom have been there since the beginning. The factory produces about 90 per cent of all windings for VEM motors made at Wernigerode. Every day at least one 24-ton truck leaves the factory to supply motor parts to Saxony and Sachsen-Anhalt. The returning trucks carry materials which are needed for production in Slovakia. The factory is ISO 9001:2000 certified and all employees, the quality of the products and the production output meet the expectations of VEM motors. The conditions of the workers in Piešťany



The Slovakian company produces 90 per cent of all windings for electric motors from VEM motors.

are in no way inferior to those in German VEM facilities. Jürgen Sander, managing director of VEM motors and VEM Slovakia, summarises the work done by the Slovakian VEM subsidiary: "With the help of VEM Slovakia we have succeeded in secur-

ing the market share of the VEM Group despite the harsh competition. Flexible production organisation and modern management enable the factory to adapt the production capacity to the growing demand for VEM electric motors at any time."



Premises of VEM Slovakia in Piešťany

# Exhibitions in 2006 – a retrospective

SUMMARY

"Water Berlin" International Exhibition was this year's highlight



**Keulahütte.** The technical pipeline conference in Oldenburg in February, "Water Berlin", the Hanover Fair in April and the Water Managers' Congress in Travemünde this December are traditional entries in the diary of Keulahütte. The highlight event in 2006 was the "Water Berlin" International Exhibition. We met about 280 visitors for interesting talks at our stall. The customers of our principal market in Central and North Germany, in particular, - technical managers and the water man-

The modern exhibition stall of Keulahütte at "Water Berlin"

agers of public utility companies and special-purpose associations, engineering consultants and construction firms, even traders - were interested in an intensive exchange of views.

The traditional Lusatian evening on 5th April 2006 was a success and was received well by customers as a modest thank you to them.

At the Hanover Fair, we presented us at the VEM stall in Hall 11, our traditional domicile there. Again we had good talks with a large number of buyers who are interested in our job castings. New potential contacts were also made.

# Low-energy motors – business as usual?

ENGINEERING

VEM motors participate in the "Renewed Voluntary Agreement" and push the use of energy-optimized drive systems

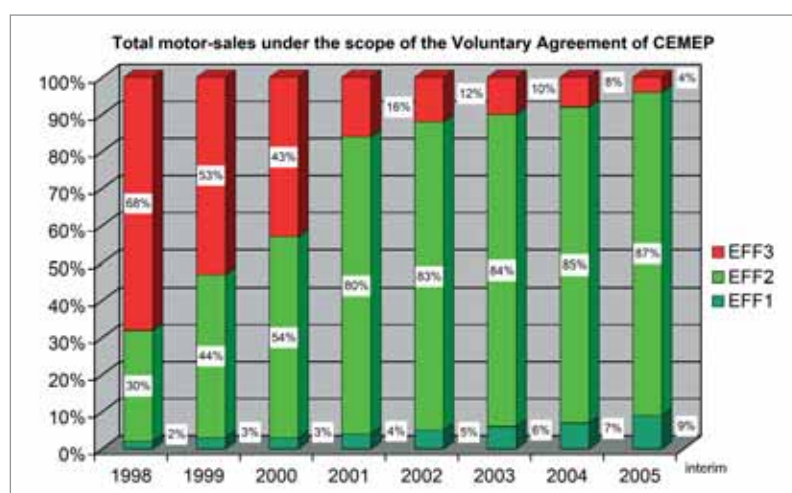
**VEM motors.** The global development in low-energy motors in the last few years has produced a spade of national provisions, laws and standards which makes it difficult to find a level on which to compare products. Depending on the type of use, limits defined in the Voluntary Agreement of CEMEP (VA), NEMA, EPACT or special Australian, Japanese and other national standards must be observed which, furthermore, prescribe different test procedures. Add to this the requirements when the Energy-Using Products Directive (EUP) becomes effective. In the European Union the Voluntary Agreement of CEMEP with limit values EFF1, EFF2 and EFF3 has proven useful. The annual monitoring of motor sales in Europe shows that the original target defined in the Voluntary Agreement has been exceeded by far. The intention was to raise the market share of low-energy motors of classes EFF1 and EFF2 to over 50 per cent by the end of 2003. Today, the actual

market share of these motors is well over 90 per cent. The monitoring also shows that the market share of EFF1 motors is going up only slowly (see diagram). In the fall of 2005 CEMEP decided to renew the Voluntary Agreement and make rules stricter. The purpose was to ensure that only competent European motor manufacturers could participate. The scope and EFF logos will not change. VEM motors have confirmed their participation in the Renewed Voluntary Agreement and by doing so document that they are prepared to accelerate the use of energy-optimised motors and drive systems together with OEMs. Going beyond the targets laid down in the Voluntary Agreement of CEMEP, VEM ceased the production of eff 3 class motors altogether. The criteria of efficiency classes eff 2 and eff 1 now also apply, by and large, to special-purpose motors, such as marine motors, brake motors, roller bed motors and explosion protected mo-

tors. The development of new and modification of available VEM products focuses on parameters of high energy efficiency. The limits of the VA are used as guidelines for assessment. In addition to these actions with immediate effect, the European manufacturers attempt to bundle the

whole process of global activities in premium classes and take the initiative by submitting a proposal for a premium class. In addition to the actual classification of efficiency classes, this proposal suggests a generally applicable test procedure for defining the efficiency of these motors.

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Photos: Ladislav Stepanek

## EMAC staff trained in Wernigerode

**VEM motors.** To keep our customers abreast of developments and news of the VEM Group, VEM motors provide regular training to partners. For example, several employees of the VEM agency in South Africa, EMAC (Electric Motors & Components Ltd.), travelled to Wernigerode for a briefing on the product range of that VEM member.

Such visits are also necessary because the annual rate of innovation of the VEM low voltage machines is over 30 per cent so that new products are launched constantly.

In 2003, EMAC earned first orders for delivery of electric motors to steel and rolling mill industries in South Africa.

VEM motors shipped 24 type ARC size 132 roller table motors to the South-African steel giant "Isacor", now member of the Mittal empire.

So far, VEM have delivered 191 roller bed motors in sizes 132, 160 and 180.

Ernst Günther Klose of the firm Klose Engineering had been to South Africa several times before the deal was closed, made valuable inputs and was instrumental to VEM winning the order.

As VEM products are very good value for money, EMAC was able to win further projects for low-voltage slip-ring motors for cranes and hoists.

EMAC, with eleven employees one of the smaller agents of VEM, has a very committed management team.

The company receives active support from the firm Kurt Maier Motor Press in Kalefeld, Germany, with whom ties are close for mutual benefit.

At present EMAC is the only supplier of electric motors made in Germany to the South African market.

The firm expects that sales of VEM motors will go up further because mining and steel production are two booming sectors in that African country.

NEWS

## VEM Group active within IEC

**VEM Group.** A new working group of the International Electrotechnical Commission (IEC) started work in October.

The task of the new working group is to revise the seven IEC standards 60034-18-xy on "Design/qualification of winding insulation of rotating electrical machines" in the next seven years.

As an established and internationally respected expert in this field, Dr. Frieder Kielmann will support the work of the group as part of his work for VEM and cooperate in the joint targets of the manufacturers of motors and generators in the working group.

# Range of terminal boxes expanded and revised

ENGINEERING

Terminal box 200A, series B complements new range of terminal boxes



Fig. 1: Test setup for the jet water test for protection type IP X5

**VEM motors.** The development of terminal boxes 1000, 630 and 400 marked the beginning of VEM motors' revision of the terminal concept in motors for potentially explosive environments. The new terminal boxes have ample terminal space and have been tried and tested in industrial environments. The launch of the terminal box 200A, series B, Ex e II, is another step in this direction.

The terminal box has been tested for compliance with the requirements for seriously hazardous environments according to EN 60079-0:2004 and EN 60079-7:2004 and the 6th Amendment of EC type approval test certifi-

cate IBEU00ATEX1051 U of 21/12/2005 for application in "e increased safety" type of protection, equipment group II, equipment category 2G has been issued. The terminal box is also used in motors with "n" (non-sparking) type of protection according to EN 60079-15:2003 and motors with protection against dust ignition in "protection provided by enclosure", tD A21, and in motors of VIK design (VIK recommendation No. 04.2005).

The terminal boxes have degree of protection IP 65. Compliance with the requirements of the degrees of protection IP X5 (water jet, see Figure 1) and IP 6X (dust-tight design) according to EN 60529 has been proven by tests.

The design with explosion-proof enclosure can be supplied with different terminal boards, depending on the rated output and the rated voltage:

## Design of KM10/8 and KB 5130 Ex terminal boards (cf. Figs. 2 and 3)

Board for primary terminals	KM10/8	KB 5130 Ex
Rated voltage, max.	750 V	750 V
Rated current max.	100 A	118 A
Rated cross section	70 mm <sup>2</sup>	35 mm <sup>2</sup>
Auxiliary terminals	max. for	3 x 2 miniature terminals
Rated voltage	max. 420 V	
Rated current	23 A	
Rated cross section	2.5 mm <sup>2</sup>	

The new terminal box replaces the explosion-proof terminal boxes type K1X 200 A and K2X 200 A.



Fig. 2: With KM 10/8 terminal board



Fig. 3: With KB 5130 Ex terminal board

Terminal box 200A, series B, with terminal board KM 10 can optionally be used for standard motors without explosion protection. That design will

also replace the terminal box type VGK 200 with casting compound cable glands where the increased height of the box permits installation.

## Specifications of the new terminal box

Ambient temperature	-35°C to 55°C	
Dimensions:	Length (x)	330 mm
	Width (z)	270 mm
	Height (H <sub>k</sub> )	147 mm
Cable glands:	Standard design	2x M63x1.5
	Power circuit maximum	2x M75x1.5
Auxiliary circuits	Standard design	max. 2x M20x1,5
	Optional	customized

As part of the work for the new registration of terminal box 200A, series B, all explosion-proof terminal boxes complying with norms EN 60079-0:2004 and EN 60079-7:2003 were revised.

The revision was confirmed by the 5th Amendment of IBEU00ATEX 1051 U.

This brings the explosion-proof terminal boxes of VEM motors in line with the latest norms.

## Low-energy motors – business as usual?

continued from page 7

The process has been started with the present standardisation procedure for international technical standardisation by IEC, the methods of measuring the efficiency of electric motors (coming edition of IEC 60034-2) and the efficiency limits of asynchronous machines (NWIP 2/1390/NP) and will put an end to the present international confusion about efficiency requirements and test procedures.

VEM are also active contributors to this process and prepare the development of drives and drive solutions with still higher efficiency. The activities described here are active contributions by the European motor manufacturers to the implementation of the EUP directive.

### What is the Directive about?

It sets the requirements for the environmentally friendly design of energy-using products and as such the Directive is an important activity for reducing the emission of carbon dioxide into the atmosphere. It primarily addresses energy-using products in the consumer goods sector but electrical drive systems are also included. The EuP framework Directive was published in the Official Journal of the EU on 22nd July 2005 and

member countries must transform it into national legislation by 11th August 2007. The framework Directive itself has not taken effect yet. Criteria for product groups yet to be selected are defined by later so called "implementing measures". The adoption of product-related implementing measures is expected for 2008 and later. In preparation of the product-related measures, the EU Commission tendered a study. The following drive system products (lot 11 of the Study) will be studied:

- Electric motors between 1 and 150 kW
- Water pumps (in business buildings, drinking water pumping systems, in the food industry, in agriculture)
- Recirculation pumps for buildings
- Ventilation fans (buildings, except for residential use).

The study was awarded to the well-known motor expert, Prof. Almeida, of Coimbra University in Portugal. The line of intersection for the activities from the EUP Directive and the present standardisation activities is the year 2008.

At that time, it will be seen whether practicable limits and solutions will have been found which are suitable for achieving another substantial reduction in the emission of carbon dioxide.

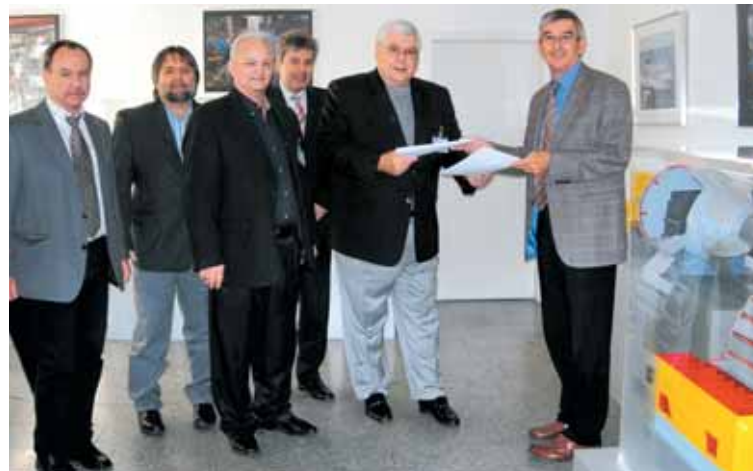
## Service contract for generators of wind power plants in the U.S.A.

**VEM Sachsenwerk.** VEM Sachsenwerk and the company Shermco Industries, Dallas, Texas, U.S.A. have agreed on the continuation of their cooperation in the field of wind power generators and concluded a service contract in October. The contract was signed by Peter Sherman, Vice President Scott Meadow, Gerhard Freymuth, Managing Director of Sachsenwerk, and the responsible Distribution Manager, Joachim Zwick.

After the 1000th wind generating unit from Dresden will go into service in the U.S.A. at the end of 2006 and growth will continue to

be strong, the new partner, Shermco, will also put the service and after sales activities in the United States on a solid foundation. Shermco is a leading provider of generator repair and field services in the south of the United States. The UL® certified workshop with a workforce of about 150 has over 30 years experience in the industry.

As the first concrete step of cooperation, several Shermco employees were trained in final assembly operations and testing of wind generators during a hands-on assignment at Sachsenwerk.



Peter Sherman (2nd from right) and Gerhard Freymuth (right) are seen signing the contract.

## ANNIVERSARY

### VEM motors looking forward to 60th anniversary in 2007

**VEM motors.** Several festive events will mark the 60th business anniversary of VEM motors in 2007.

The production of electric motors began on 31st January 1947. The workforce numbered 200 at that time.

The year before the Soviet Military Administration had decided to set up one factory on the site of the Rautal works instead of four electric motor manufacturers in the region.

The first 200 motors were shipped from the Wernigerode factory on 1st May 1947.

A new motor series was added during each of the decades that followed. Totally over 10 million motors have been produced since 1947. Today buyers of motors in the 5.5 to 500 kW output bracket come from over 50 countries.

## NEWS

### Keulahütte to attend 2007 Pipeline Conference

**Keulahütte.** The Pipeline Conference in Oldenburg is attended by all manufacturers in the water sector. Oldenburg University of Applied Technology has been the conference organiser for more than ten years.

The conference meets with excellent response from both visitors and exhibitors. The papers of the conference address important topics and are at the core of the event. The accompanying exhibition in the corridors and some rooms requires that exhibitors and visitors be considerate of each other.

Still, attendance is a "must" because the conference is the focus of discussions of the general situation on the market.

Next year Keulahütte will take part as exhibitor for the seventh time. Interested parties can find us at the usual place: H-15, on the 2nd upper floor, on 8th and 9th February 2007.

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