02 2008

CUSTOMER INFORMATION

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Impulse

VEM SACHSENWERK • VEM MOTORS • VEM MOTORS THURM • KEULAHÜTTE

Dear friends and colleagues,

At a closed-door conference at Hohenerxleben Palace, the managing directors and I discussed a programme with which we can weather a crisis-induced 30% drop in orders without equity losses in the individual companies. Decisive in such a situation is that our customers must continue to receive their deliveries reliably, punctually and in the accustomed high quality. We intend to avoid losses of regular jobs, while at the same time raising the technical competence of both our shop-floor employees and engineering staff. It was calculated that this is possible. We will also continue to increase our value creation potential, pursue further specialisation in our selected market niches, and expand our market shares, especially in Eastern Europe. An investment programme with a volume of approx. € 50 million between 2008 and 2011 will concentrate on improvement of our logistics processes, testing capacities, in-house training facilities for both production workers and engineers, new product develop-

"We will already be faster, even more punctual and even more competitive."

ments, and the establishing of new manufacturing competence to strengthen our independence. Where necessary, we will also adapt and upgrade social facilities to reflect the coming tasks. It would go far beyond the scope of this editorial to list the details, but I would at least like to mention a few of the most important projects for the VEM Group – in strictly alphabetical order of the locations.

Both the management and myself attach great importance to your recognising in this connection, how preparations are already being taken today to master future crises, how we plan to safeguard the existence of the company and protect the employees for whom we are responsible from the consequences of failed government energy, taxation and currency policies.

The next five years will reveal whether or not we have been successful. Success is highly dependent on your understanding for our plans, and on our joint commitment to VEM.

But now, as promised, a few words about individual projects:

Dresden: New training centre building with classrooms and workshops; new social facilities; new test stand for outputs up to 6 MW; new hall for large machine manu-

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Large machines route to Ural

Twin drives from Sachsenwerk for the largest steel producer in Russia

The first of six large machines will be ready for shipping from Dresden shortly. Sachsenwerk has manufactured the first twin drive (two synchronous machines with 12 MW output each) for a roll stand at the largest steel producer in Russia, the Magnitogorsk Metallurgical Combine (MMK). The orders were awarded by SMS Demag for "MMK5000" and Novokramatorskij Metallurgitscheskij Zawod (NKMZ) for "MMK 2500".

The permanent reversing operation places extreme demands on the mechanical strength of the rotors, and with peak axial forces of 2,000 kNm, or even 4,000 kNm in shock situations, also on the bearings. The machines are designed as cylindrical-rotor machines with brushgear excitation for converter-fed operation. The rated torque is 1,910 kNm, with capability for a momentary 2.5x overload. The synchronous motors from Sachsenwerk are thus the largest of their kind currently manufactured by any of the lead-ing manufacturers worldwide. With a weight of 502 tonnes per twin drive, these giants add further proven design features to the already successful type series of rolling mill machines from Sachsenwerk. VEM is thus able to respond to the highest customer demands with regard to manufacturing, quality and logistics.

The first machine will be setting off on its journey to Magnitogorsk in the third quarter of 2008. The other two twin drives (2 x 2 synchronous machines, 8 MW each, torque 1,910 kNm) for "MMK 2500" are scheduled for delivery in 2009. The associated 1,500 roller tables and auxiliary drives are also to be supplied by VEM and will be heading eastwards from the works in Wernigerode before the end of the year.

Photo: Karin Wagner

Millimetre clearances: Insertion of the giant rotor into the stator calls for ultimate precision.

Binding legislation necessary

Jürgen Sander: CEMEP and VEM in full agreement on energy-efficient motors

Has the recent energy price explosion boosted the customers' readiness to use more energy-saving motors?

Statistics presented by ZVEI and CEMEP show that the demand for motors of efficiency class IE2 (currently still EFF1) has indeed risen significantly. The voluntary CEMEP agreement to introduce this classification for electric motors was already a step in the right direction. The topic is also of great interest in connection with the modernisation of existing installations. ZVEI estimates that around one-third of the 30 million electric drives in Germany are in need of modernisation. If all these drives were to be equipped with energy-optimised electric motors, it would be possible to save 27 billion kilowatt-hours of electricity every year. Motors of the poorest efficiency class EFF3, by the way, have practically disappeared from the European market. The current energy discussion has already

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Photo: Wolfgang Koglin

Jürgen Sander, managing director of VEM motors GmbH, is at the same time president of the working group on low-voltage motors at the Association of European Motor and Drive Manufacturers CEMEP.

CEMEP

European Committee of Manufacturers of Electrical Machines and Power Electronics

PSM: Nominal output and efficiency tested

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Look ahead to the 7th Technical Conference in Wernigerode

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Remembering a great celebration: 100 years Thurm

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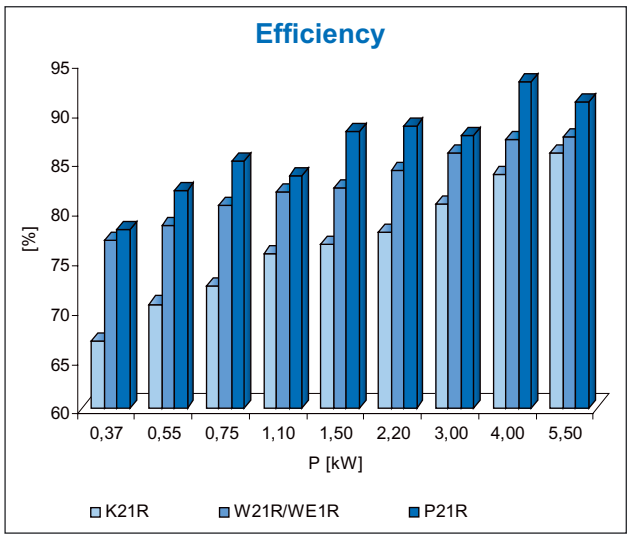
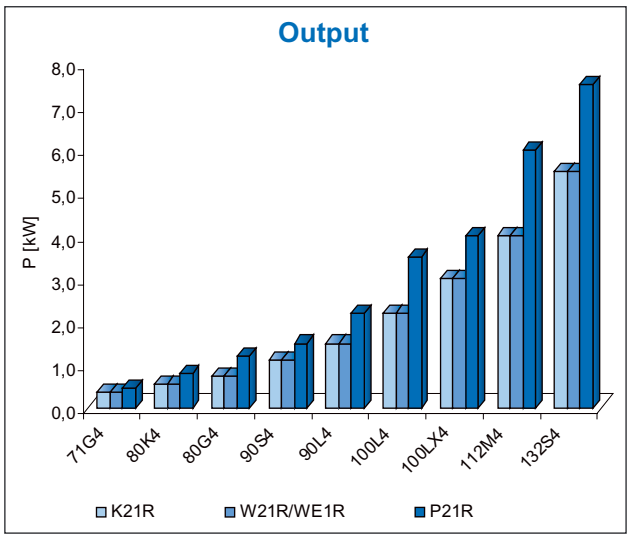
Improved efficiency and higher nominal output

Permanent-field synchronous motors with frequency converters score with good energy efficiency





Exploding raw materials and energy costs, paired with enhanced environmental awareness, have led to an increase in demand among our customers for permanent-field synchronous motors (PSM) with frequency converter. Being without rotor currents, corresponding losses in the rotor can be avoided and exploited for greater utilisation of the active material of the stator. That serves to raise both the efficiency and the nominal output, despite the considerably reduced current consumption. The result is a higher torque from the same shaft height/field width, or else a smaller size or lighter design for the same output. The left-hand diagram compares the efficiency of the 4-pole series 0.37 ... 5.5 kW, 400 V, 50 Hz, placing the permanent-field synchronous motors P21R ... (PSM) alongside the corresponding asynchronous machines K21R ... (EFF2) and W21R / WE1R ...(EFF1) with the same output.

The potential for higher torque and thus higher nominal output compared to the standard asynchronous machine of the K21R series is illustrated in the right-hand diagram, which compares the 4-pole series in frame sizes 71 ... 132, 400 V, 50 Hz, again placing the permanent-field synchronous motors P21R ... (PSM) alongside the corresponding asynchronous machines K21R ... (EFF2) and W21R / WE1R ...(EFF1).

The permanent-field synchronous motors are tested on a drive test stand developed in cooperation with the electrical engineering department at the West Saxon University of Applied Sciences in Zwickau.

The objective of the PSM motors is not to replace asynchronous machines in stiff systems or highly dynamic servo drives. The intention is rather to reduce the costs of the drive system for converter-fed applications by using the P21R motor series. The above-mentioned benefits are often able to shorten the payback period to less than a year, despite the higher initial outlay. Use of this motor series is especially expedient in general variable-speed applications with increased demands regarding energy utilisation and/or size/output ratio, and for synchronous applications, transport belts and positioning tasks with position encoders.

| WORKSHOP OFFER |

Customers interested in **permanent-field synchronous motors** or the new **compact drive MT21R** from VEM motors Thurm can pre-register for a corresponding workshop.
Probable date: 16th October in Zwickau
Please contact: Sabine Heuer, ☎ 0375 427 123

| CERTIFICATION |

Converter-fed motors for hazardous locations

When it comes to applications in areas subject to explosion hazards, explosion-proof motors with increased-safety protection represent an optimum solution for Zone 1 (group II, category 2) from both the safety and economic point of view. These motors are subject to certification in accordance with directive 94/9/EC ("ATEX95"). Frequency converters are also encountered increasingly in Zone 1 where energy-efficient drive speed control is important. However, the previously expensive and inflexible certification process meant that more expensive motors with explosion protection rating "d" or "de" were preferred over more favourably priced increased-safety (Exe) motors. Now, the PTB Braunschweig has elaborated a simplified test and certification process which is at the same time less expensive for both manufacturers and users. Common approval of the converter-motor pair is no longer necessary for protection type "e". VEM is currently preparing the series **K..R 71 to 315, 4-pole,** in this new version. The type outputs 4.6 kW to 20 kW are already available. The outputs from 30 kW to 55 kW will follow step by step from the third quarter of 2008, and all remaining types from the beginning of 2009.

| TRACTION MACHINES |

New test stand

Photo: Karin Wagner

The test stand was set up by Vogelsang & Benning, and handed over to Sachsenwerk in July.

Sachsenwerk now possesses a new traction machine test stand, immediately adjacent to the recently optimised assembly area for traction machines. Commissioning of the new test system (up to 400 kVA) has reduced the previous crane waiting times considerably. The routine testing of traction and wind power machines can now be performed independently of each other. The optimised logistics achieves sustained time savings in the manufacturing processes. The state-of-the-art equipment enables automated test sequences, and also provides an interface to SAP for data recording and test report generation. The full test data can be recalled at any time.

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facturing; concentration of site areas with a new car park. Expansion of electronics competence to flank our existing niche policy; planning for steel construction competence at the location.

Krauschwitz: New hall to expand hand moulding by 2,500 tonnes of good castings per year; demolition of old buildings. Further automation of cleaning; site concentration. Improvement of the grounds; strengthening of machining; logistics optimisation.

Thurm: Investments in shaft and rotor manufacturing to shorten delivery times. Machinery modernisation.

Wernigerode: New 3,000 m² hall alongside Hall 5 for large low-voltage motors. Investment in a 120 kg die-casting plant in Hall 2 alongside the present die-casting shop. In a second stage, a logistics hall is to be erected, together with a training centre for skilled workers and young engineers. Competence in hybrid drive solutions is to be maintained and updated. Stabilisation of the current levels of productivity and service quality.

Parallel to these measures, we will gradually attempt to replace the agency and temporary contracts of our best and most reliable workers by offering them regular employment contracts. The proportion of such temporary contracts is much too high, especially in Krauschwitz. The manufacturing locations Most and Piestany are to be maintained. Decisions on investments at these locations will be made at the appropriate time.

There is a mountain of work, planning and decision-making ahead of us. We are not yet feeling the impact of declining orders. But when the time comes, we will already be faster, even more punctual and even more competitive. It will no doubt also be to our advantage that labour costs are rocketing in China, Eastern Europe and South America, and that the unrestrained transfer of labour-intensive work to such countries will prove to have been a mistake for many others. The fitness programme of the past 11 years has done VEM good. We have no need to fear competition.

So let's roll up our sleeves and get down to business!

Yours,
Freiherr von Rothkirch

continued from page 1: **Binding legislation necessary**

led to countries such as the USA, China and Australia passing legislation stipulating the exclusive use of motors with high efficiency ratings. Europe, too, is working towards such statutory regulations.

Different opinions exist as to which efficiency standards are to apply in the EU and from when. Where do the differences lie?

The standpoint of CEMEP, which is also shared by the VEM Group, is unambiguous: Subject to the outcome of the final consultations of the IC standards commission, IE2 should become the minimum efficiency class with effect from 01.10.2011. In this connection, we view the motor and converter as a single energy-saving unit, which provides for additional savings potential and thus raises energy efficiency. The premium class IE3 should be subject to self-regulation. As Europeans, we are furthermore in favour of independent certification for motors from 0.75 kW to 370 kW.

Other lobbies would like to see binding directives to specify IE2 from 2011, and then IE3 for motors larger than 7.5 kW from 2015. A third line of thought is that of the non-government organisations (NGO), who are calling for IE2 from 2010 and then IE3 without exceptions from 2012. It is sure to remain exciting!

The EuP framework directive has now been in force for a year. How does CEMEP assess the results of this first year?

The directive triggered, among other things, Prof. Almeida's study concerning lifetime-oriented analysis for electric motors. Thanks to the study, we know where we stand today and what we can achieve. The directive must now be translated into national legislation as quickly as possible, with clear stipulations for the motor manufacturers. The CEMEP welcomes the introduction of IE2, as is also proposed in the study by Prof. Almeida. The classification of the motor efficiencies will be defined in the new European standard EN 60034-30, so that here, too, standard and legislation will be running hand in hand.

What has CEMEP planned for the coming months?

We are actively supporting the introduction of statutory minimum efficiency levels on the basis of IE2 from 01.10.2011. In the meantime, a system of financial incentives could promote the widespread use and acceptance of energy-optimised motors and drives and speed up their further development. This is also to be a topic at the 7th Technical Conference in Wernigerode. And it goes without saying that we will be keeping our readers up to date on the latest developments in the next issues of Impulse.

Exciting discussions on the agenda

With energy efficiency and explosion protection, two highly topical subjects are on the agenda of the 7th Technical Conference in Wernigerode

The Technical Conferences in Wernigerode have always been understood as a meeting place for branch experts and a forum for discussion of the latest technical and economic developments – and this year's seventh conference remains true to this tradition. The VEM Group has invited participants to Wernigerode on 16th and 17th September.

Two important topics dominate the agenda. The first concerns technical innovations in explosion protection and their impact for drive systems. Especially recently, after all, there have been many changes affecting the standardisation and approval of explosion-protected motors. Gearbox manufacturers, drive system suppliers and machinery manufacturers will thus be able to exchange information and experiences. Experts from important test and certification bodies, such as PTB Braunschweig and Dekra EXAM, will be present to explain the current situation and answer questions. In this context, the forum will be addressing not only German circumstances, but instead the whole European situation with regard to explosion-protected drive systems. Participants from Russia, France, the Czech Republic and China will be contributing their specific experiences to the discussion.

Focus on energy-saving motors and innovations in explosion protection

The second focus of the 7th Technical Conference is to be placed on current developments in the field of energy-saving motors and energy-efficient drive solutions. This topic also promises an exciting dialogue. Alongside the CEMEP standpoint, which is also shared by the VEMGroup, two other quite contrary opinions have emerg-ed (see also page 1 of this issue). One objective of the two-day meeting in Wernigerode is thus to weigh up the pros and cons of the different views and hopefully to achieve an element of clarification.

Energy-saving standards and explosion protection – Complements or contradiction?

Dirk Seehase, VEM motors GmbH

Specifications pertaining to efficiency determination (future version of IEC 60034-2) and efficiency thresholds for asynchronous machines (EN 60034-30) have initiated an international standardisation process with regard to efficiency and the associated measuring procedures. The new standards are at the same time the basis for implementation of the EuP motor study and thus also for definition of minimum efficiency ratings for electric motors. The new efficiency standard EN 60034-30 addresses the output range from 0.75 to 370 kW for 2, 4 and 6-pole motors. Numerous modifications are to be added to the scope of validity, for example brake motors and geared motors.

These specifications represent a significant expansion of the applicability of previous voluntary agreements. It is assumed that the standards will become binding from mid-2009, with a corresponding transition period of approx. 3 years for a European minimum efficiency class.

The draft standard (status FDIS/Final Draft International Standard) includes all motors for use in explosive atmospheres (IEC 60079-0 and IEC 61241-1). All protection categories relevant for electrical equipment, such as flameproof "d", increased-safety "e", non-sparking "n" and enclosure protection "tD A21" and "tD A22", are thus integrated into the efficiency classification. From the design point of view, the motors in Ex d/de, Ex nA II and dust-explosion-protected versions are relatively unproblematic. There are here no special size/output assignments. This means that EN 50347 is fully applicable for these motors. The explosion protection for these protection types concentrates first and foremost on special design measures, such as the use of certified components, increased creepage distances and clearances, measures to avoid static charges with fans, the observance of specific IP ratings and materials selection (in particular with regard to the aging of sealing elements). Temperature-limiting measures in the interior or on the surfaces of the motors are similarly not contradictory to high efficiency. In fact. there are already motors to be found on the market for these protection types with EFF1 efficiency. VEM, too, has for some time been offering the energy-saving WE1R/W21R series in versions with "Ex nA II" and "tD A21/tD A22 enclosure" protection.

The situation in respect of increased-safety motors is comparable. In this case, the above measures are supplemented by temperature limitation in case of fault, which places special demands on the starting current and the guaranteeing of maximum t_E times. Size/output assignments are still governed by the DIN 42673 and DIN 42677 standards in Germany.

The series of motors with increased-safety protection (category "e") will in future remain based on the active materials of the basic series. This meets the general prerequisites for compliance with future efficiency classifications. The lower capacity utilisation of the motors is here a positive factor, and the availability of explosion-protected motors for high-efficiency classes is thus only a question of time.

EC prototype test certificate for converter-fed asynchronous motors in increased-safety versions for Zone 1

Ralf Pliquett, Getriebebau NORD headquarters, Bargteheide

EC prototype test certification has been sought for a motor series in the output range from 0.12 kW to 15 kW. The basis was an approval concept presented by the PTB in Wernigerode on 12th September 2006, which envisaged voltage supplies to asynchronous motors for explosion protection category "e" via "freely chosen" frequency converters. The stipulations of DIN EN 60079-7 require that converterfed asynchronous motors be tested as a single unit.

From the point of view of the user, this brings the following disadvantages, among others:

- Individual approval testing (especially disadvantageous for small batches)
- Extended commissioning and delivery times due to the necessary inolvement of a listed office
- Difficulties in case of replacement, possibly including new approval testing
- Higher costs

For these reasons, only very few prototype test certificates are issued for converterfed asynchronous motors for protection category "e". Users instead tend to choose protection categories "de" or "d".

The new PTB approval concept offers industry possibilities to use "e"-category asynchronous motors in applications where they have to date chosen a "d"-category version. This has the following benefits for the user:

- Less expensive alternative to "d"-category motors
- Reduced weight
- Free choice of frequency converter within a defined set of properties
- Comprehensive engineering support from manufacturers

The starting point for the approval is a motor for protection category "e" which is certified for a sinusoidal supply system.

Following inspection and acceptance of the mechanical design, thermal tests are performed at defined operating points (50 Hz characteristic and 87 Hz characteristic) with a pulsed power supply.

Software adaptation in the frequency converter meets the demand for speed-dependent current limitation. Comprehensive measurement series assess the insulation system in respect of partial discharges.

A project matrix permits reliable dimensioning and pairing of the motors and frequency converters.

Dust-explosion-protected electrical equipment – What is to be expected from the new IEC standards?

Michael Wittler, DEKRA EXAM GmbH, Bochum

The series of European standards beginning with EN 50014, which were already introduced at the end of the 1970s, have recently been replaced by a package of standards originally drawn up at IEC level, namely IEC/EN 60079, or for the dust explosion field the IEC/EN 61241 series, which will in future also be integrated into 60079. Alongside the important existing concept of enclosure protection for electrical equipment for locations with a dust explosion hazard, the protection types intrinsic safety, encapsulation and pressurised enclosure have now also been introduced for dust. Further steps will see the establishment of the equipment protection levels Da, Db and Dc – comparable to the equipment categories under the ATEX directive 94/9/EC.

Markings permit immediate recognition of the suit-ability of equipment for Zones 20, 21 or 22. In future, dusts will be divided into three groups: IIIA (lint), IIIB (non-conductive dusts) and IIIC (electrically conductive dusts). In the same way as for gas explosion ratings, equipment is marked with one of these dust groups.

Details of the new classifications and information on changes in technical demands will be presented in a contribution to the Technical Conference in Wernigerode on 16th and 17th September. The presentation will be based on the currently applicable standards and changes which can already be recognised in new drafts.

100 years for innovation

VEM motors Thurm celebrated a festive centenary

Photos: Mirko Hertel, WIREG/ Vorratz

During the laser show. Photo right: Managing director Dieter Bellstedt and Rupprecht von Rothkirch with a very special truck. To mark the centenary, KS – Logistic & Services designed new trailer tarpaulins to thank its Zwickau partner for the long-standing and fruitful cooperation.

On the last weekend in May, VEM motors Thurm welcomed customers, friends and partners to celebrate the centenary of its founding. The guests included also prominent representatives of the economy and politics.

Treated to perfect summer weather, the customer event began with a symposium in the "Neue Welt" Concert Hall and Ballroom in Zwickau. The company history was naturally an important topic, alongside product information and development trends in the field of electric motors. An early-afternoon tour of the factory added also first-hand insights. In the evening, managing director Dieter Bellstedt welcomed the guests to a festive gala. Besides those from shareholder Ludwig Merckle, congratulations were also passed on by the Saxon Economics Minister Thomas Jurk and Zwickau mayor Pia Findeis. The film "100 Years for Innovation" was then given its premiere and illustrated the turbulent history of the company in entertaining sequences. A fine 4-course dinner spoiled our guests' palates. Once darkness fell, a light spectacle began in the park, and a laser show designed specially for VEM motors Thurm brought the evening to a close. The words of Hans-Jürgen Maier, managing director of Maier Elektrotechnik GmbH, are representative for the opinions of many guests: "It was a very successful event, which will remain firmly in my mind".

Thank you for the wishes from our partners and guests

We would here like to thank everyone for their good wishes and gifts. There is one thing of which you can be sure:

The commitment of the Merckle family, a century of experience and the work of our outstanding specialist staff remain guarantees for the sophisticated and reliable solutions we will continue to offer our customers in the future.

| VEM MOTORS AWARDS GRANTS |

Initiative to promote young engineers

To attract young people to technical study disciplines and to secure their services for local industry – that is the objective of an initiative started in the state of Saxony-Anhalt. With the aid of corresponding grants, it is hoped to overcome the shortage of engineering specialists on the labour market, and also to strengthen the region as an economic location. The initiative was founded by the State Ministry for Economics and local enterprises in 2007.

VEM motors GmbH is one of ten companies supporting the initiative. The response among coming university and college students has been very positive. A total of 221 applications were received for the 22 grants – among them 107 from students interested in cooperation with VEM. The selection committee in Wernigerode reduced this number to 17 whose intended specialisations matched to profile and requirements of the company. Following thorough assessment and intensive personal meetings, four candidates were finally chosen. The four received their grant certificates from the works manager at a ceremony in the presence of the Economics Minister of Saxony-Anhalt in Halle on 15th May 2008. They will be starting their studies in October this year, and can now look forward to a grant from VEM motors.

Part of the VEM team from October: Lucas Bornschein, Anja Bergemann and Justina Kieselbach, electrical machine design at the Harz University of Applied Sciences in Wernigerode; Oliver Vogel, mechanical engineering at the TU Magdeburg (left to right).

Lifelong product tracking

Dr. Rainer Laaß: Quality manager at VEM Sachsenwerk

Open, judicious, competent, modest in his manner, but absolutely committed to his work – that is the way many customers have come to meet Dr. Rainer Laaß. A graduate electrical engineer, he has for the past year been in charge of a team of around 40 staff, including also the team from the test stand responsible for quality assurance.

An important part of his work is covered by the three letters PLM. Product Lifecycle Management covers the whole period from the first customer contact, via development, design, manufacturing and delivery, through to the very end of the product's "lifetime". Software-assisted documentation gathers together all relevant test results, fault diagnoses and service reports. It is thus easier to identify the causes of faults at any time in the future, and proven solutions can be integrated into new projects. "It is true that Sachsenwerk products are all actually unique, but they still build upon certain design principles," Dr. Laaß explains. "We look at the performance in practice to find out, which of these design principles can be generalised and used for coming projects." Such knowledge serves not only to ensure constant high quality. It also helps the customer to better specify demands for future orders.

Dr. Laaß is convinced that quality is above all a question of customer satisfaction and costs. For him and his team, it is irrelevant whether the product is a giant machine for a rolling mill or a small drive for trams. What makes the company so special: "At Sachsenwerk, all orders are handled as projects, and are managed by a specific team of sales representatives, designers, production staff and test engineers. There are only few manufacturers in Europe with the know-how to realise large project-specific machines, generators and motors, and then to accompany them over their whole life cycle." The close networking of the individual companies in the VEM Group has added a few new tasks to the job profile of the quality department staff over the past couple of years. "Of course, each VEM company has its own quality department," Dr. Laaß reassures, "but there are nevertheless various interfaces for certain projects. Those interfaces are also our responsibility."

Photo: Karin Wagner

Dr. Rainer Laaß with a wind power generator which has just passed its testing after manufacture at Sachsenwerk

New book tells the VEM story

"People, motors and metal. A journey through 150 years of industrial history" is the title of a new book which will be coming onto the market in the autumn. With a blend of high-quality photos and texts in German and English, the 160 pages document the traditions built up over the course of one-and-a-half centuries at the VEM locations Dresden, Wernigerode, Zwickau and Krauschwitz – not as a plain history book, but instead paying attention also to the people behind the events. The book will no doubt reveal some of the secrets of the business success enjoyed by the VEM Group.

For further information and advance orders, please visit: **www.kommunikation-schnell.de**

| IMPRINT |

Publisher:
VEM-Firmenverbund/
VEM-Gruppe

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Art:
Kommunikation Schnell GmbH, Dresden

Editorial deadline:
25th July 2008

Print:
Druckerei Vetters GmbH & Co. KG