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NIEKTÓRE ASPEKTY DOBORU SILNIKÓW ENERGOOSZCZĘDNYCH ZASTĘPUJĄCYCH SILNIKI STANDARDOWE

SOME ASPEKTS OF A CHOISE OF THE ENERGY-EFFICIENT MOTORS USED IN THE PLACE OF THE STANDARD MOTORS

Abstract: Speeds of the energy-efficient motors are almost always higher than the speeds of the standard motors identical with the rated outputs and the number of poles. It is necessary, these speed differences to take into account in evaluation of the energy effect obtained as a result of application the energy-efficient motor instead of standard one. The recommendation is especially essential as the energy-efficient motor has the die-cast copper rotor.

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SILNIKI INDUKCYJNE KLATKOWE Z WIRNIKIEM ZALEWANYM MIEDZIĄ

INDUCTION MOTORS WITH DIE–CASTING COOPER ROTORS

Abstract: One of the ways to improve the efficiency of an induction motor without increasing of frame size is to change the rotor cage material from aluminum to copper. Thanks to such an operation, the rotor cage resistance is decreased by about 40% and rotor’s resistance losses are also significantly decreased. In consequence the efficiency of induction motor is higher by 1 to a few percent (depending on motor size and power). The copper rotor cages have been manufactured for many years using prefabricated copper bars. Such a construction of rotor cage is relatively expensive in manufacturing, and this is the main reason why this construction is usually used only in high power induction motors. Low and middle power induction motors have, in more cases, the rotor cage manufactured as an aluminum casting because of simple and inexpensive manufacturing technology. Since a few years in foreign technical papers and books an increased interest in casting of rotor cages with copper can be observed. In this paper the advantages and benefits of using rotor cages with copper casting are presented and discussed on an example of 4 pole induction motor with frame size 132.

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SILNIKI TRAKCYJNE Z MAGNESAMI TRWAŁYMI – NOWA JAKOŚĆ NAPĘDÓW ELEKTRYCZNYCH

PERMANENT MAGNETS MOTORS - A NEW SOLUTION FOR ELECTRICAL DRIVES

Abstract: The paper deals with permanent magnets motors for traction application. In past years, in locomotives designed for mining applications DC motors of output 25/45 kW were used. Since 1990 such motors have not been manufactured, so the old motors have to be replaced by new ones. Due to usage of PM, designers increased the output of the motors to 33/60 kW. The motors were designed as motors with magnets mounted on the surface of the rotor. A method of field weakening was implemented into electronic converter supplying the motor to increase the rotation speed from 1500 up to 2250 rpm. A number of laboratory test were done. The paper presents results of the tests and shows the area of installation of PM motors. Komel Centre is ready to design and manufacture motors with PM for different application (rail traction, electric cars and vehicles, pumping systems etc).
MIKROPROCESOROWY SYSTEM STEROWANIA NAPĘDU Z SILNIKAMI PRĄDU STAŁEGO BEZSZCZOTKOWYMI STEROWANYMI SINUSOIDALNIE

MICROPROCESSOR CONTROL SYSTEM OF PERMANENT MAGNET SYNCHRONOUS MOTOR

Abstract: An implementation of sinusoidal current control of a 60 kW Permanent Magnet Synchronous Motor (PMSM) is presented. The drive system consists of brushless AC motor driven by PWM converter. This system is designed for mining locomotive drive. The basic principles of PMSM motor field-oriented control and Digital Signal Controller implementation are presented. As the main control system, TMS 320F2812 microcontroller is used. Some features and advantages of applied microprocessor also presented. Examples of laboratory tests have been included in the paper in order to illustrate the operation of the designed drive system.

NISKONAPIĘCIOWY, WOLNOOBROTOWY NAPĘD Z BEZSZCZOTKOWYM SILNIKIEM PRĄDU STAŁEGO

LOW VOLTAGE, SMALL SPEED DRIVE WITH BRUSHLESS DC MOTOR

Abstract: In this paper low voltage small speed drive with DC brushless motor used as a gear of the boat has been presented. This drive consists of the motor and the electronic circuit controlling the operation of the motor. The construction of Low voltage DC brushless motor is based on typical steel sheets used in asynchronous motors. The paper presents the construction and testing results of constructed prototype. Controlling electronic circuit allows changing of turning direction, continuous variation of speed in whole operating range and limiting the current fed from the supply source. Additional functionality of the electronic circuit is fast braking of motor. This drive possesses high efficiency and can be utilized in boats sailing in calm zones.

ZASTOSOWANIE AGREGATU PRĄDOTWÓRCZEGO I PRZEMIENNIKA CZĘSTOTLIWOŚCI DO ROZRUCHU SILNIKA POMPY WODY ZASILAJĄCEJ W WARUNKACH AWARII KATASTROFALNEJ

APPLICATION OF GENERATION SET AND FREQUENCY CONVERTER TO STARTING OF WATER SUPPLY PUMP MOTOR IN HEAT AND POWER STATION UNDER BLACKOUT CONDITIONS

Abstract: In power station or combined heat and power station the biggest drive (in respect of power) is water supply pump drive. Under blackout conditions this drive is supplying from generator in power plant several hundreds kilometers away, which works as an island. Starting of this drive is difficult in such conditions. In this article potential application of a local generator set is presented.
Abstract: Over the recent years are performed researches concerning negative results of usage of frequency converters in electric drives. This refers among other things to influence of such manner on power supply of the engine, its durability, reliability, and also the all driving system on the environment. This is also connected with problems of the electromagnetic compatibility. Reasons causing the most negative influences of MSI inverters on electrical motor can be significantly reduced or even eliminated by use of the new generation MSI inverters with sinusoidal shape of the output voltage. Proposed by authors broadband power electronic voltage source uses the idea of closed loop system with negative voltage feedback, controlled in the MSI modulation with constant carrier frequency and with replacement of classical regulators broadband by digital filters. Presented in the article results clearly show that by applying in the electric drive the new generation inverters we can eliminate most problems resulting from usage of classical MSI inverters.

Abstract: In inverter-fed motors mechanism of degradation of insulation is changed. Apart from thermal ageing a degradation due to short voltage pulses have occurred. One of the main reasons of deterioration of organic insulation of low voltage inverter driven motors are partial discharges, which appeared under pulse voltage. Standard enamelled wires are not resistance to these exposure and insulation systems are usually oversized. Based on nanotechnology the new special enamel for winding wires with improved endurance to partial discharges has been developed in Electrotechnical Institute in Wroclaw with cooperative with Polifarb Cieszyn-Wroclaw. In the paper the results of the testing of dielectric properties (breakdown voltage and resistance to sine and pulse voltage) of the new winding wire enamelled with the special enamel have been presented. The new special enamelled wire spent requirements of standard PN-EN 60317-8 while its resistance to partial discharges is at least 100 times better then resistance of conventional winding wire.

Abstract: The article presents an application of diagnostic insulation high voltage induction motor off-line in industry. The paper contains an analysis of different diagnostics methods. It the usefulness of method was has talked over was in peculiarity using measurements PI, C, DD i SV - Polarization Index Testing, Capacitance, Dielectric Discharge Testing, Step Voltage Testing, Test pulse. The examples of results of measurements state isolation interesting industrial cases were passed.
Abstract: Results of dc voltage diagnostic tests of electric machines’ insulation (Fig.1) enable the evaluation of insulation’s degradation in accordance with established marking system. The paper presents marking system set from 5 to 1 – see Table 1. The relationship between marking system and characteristics/parameters of insulation system has been shown, basing on results of diagnostic tests of armature windings’ insulation of dc generator rated at 4150 kW; 730 V; 500 rpm (Figs.2-6). Table 2 gives the marks for technical assessment of insulation of 20 machines tested in 2000 and 2005. If the marks for 2005 are higher than for 2000, then it means that the machines have been rewound.

The diagnostic of insulation using dc-voltage method was made on the middle voltage AC-motors. The paper describes method of DC-voltage and shows criterion of estimation. The paper presents results of diagnostics and trends of changes proceed in insulation of many electric motors for a few years. Authors show that it is possible to predict the damage of the motor and reduce the costs of repairs.

The exploitation and failures of slip-ring induction motor (1120 kW) are described in the paper. These motors were designed and manufactured a few years ago, but due to some mistakes in design and very hard working conditions the working time was not longer than 1 year. After this period of time the breakdowns of insulation system of rotors winding occurred. It was found after the investigation that the slip-ring area was wet and full of dust what caused described failures. The slip-ring area was redesigned and equipped with a new air filter what ensures better reliability of mentioned motors.
Abstract: The paper presents analysis of forming of the induction motor bearing currents and leakage currents. In chapter 2 the causes at common-mode voltage and shaft voltage formation are described. That voltages are both the cause of EDM bearing currents forming. In chapter 3 are presented different types of parasitic phenomena caused by common-mode voltage. Internal capacitances of the induction motor is shown in Fig.5. Figure 8 shows EDM bearing currents formation. Leakage currents in induction motors supplied from PWM Inverter are presented in chapter 4. Chapter 5 describes methods for limiting bearing currents in PWM drives.

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Abstract: Damages of bearings are one of the most frequently reasons of induction motors failures. Application in power electronic systems causes that motors work in wide range of speed also at low speed. Running of motors at low speed causes a certain danger for bearings. There are introduced the properties of bearings in the paper. The investigations showed that the properties of bearings depend on the viscosity, lubricant temperature, speed and load. There are talked the results of bearings testing running at low speed in the paper. Between shaft and raceway of bearings it was turned on 0.4 V DC voltage from external source and it was observed waveforms of this voltage during starting of motors and low speed. Moreover it was determined the losses in bearing in induction motor fed from source with regulated frequency and for different positions of motors.
Influence of Bearing Currents on the Deformation of Rolling Bearings of High Power Inductive Motors

Abstract: The negative influence of bearing currents on the durability of rolling bearings in the alternating current electric motors are shown. The reasons of bearing current formation in electric motors are given. Examples of bearing races damages of cooperating rolling bearing elements are presented. Analysis of dents distribution in the roller, roll-neck and ball bearing races are made. The method of calculation of angular and circumferential scale between dents in the rolling bearing races rings are presented.

Diagnosis of Motor Rolling Bearings in Conditions of Their Industrial Exploitation

Abstract: This article describes the repeated reasons of motor damage in national industry, represented statistics of damage of motors and statistics reasons damage of rolling bearings. The paper presents the diagnostic methods in this for example the envelope analysis methods and measurement results of operating diagnostics.

Importance of Cable’s Capacity in Motor - Frequency Converter Configuration

Abstract: The paper shows the influence of capacity of motor cables on proper functioning of system included frequency converter. Its shows the methods of reduction of cables capacity and results of using a cables about incorrect parameters. Its shows also all the conditions which has to be comply by the cables functioning of system included frequency converter.
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DIAGNOSTICS ASYNCHRONOUS MOTOR WITH STATOR WINDING BREAKDOWNS

DIAGNOSTYKA SILNIKA ASYNCHRONICZNEGO Z USZKODZENIAMI UZWOJENIA STOJANA

Abstract: For finding breakdowns or defects on electric machines it is useful to use such a method, which does not demand the machine’s shutdown from running. For this reason we check our analysis method of scattered magnetic field in the neighborhood of the motor frame also for finding thread cut off on the stator winding. In this grant we show some results.

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ZALETY ZASTOSOWANIA SYGNAŁU SKUTECZNEJ WARTOŚCI RUCHOMEJ PRĄDU W DIAGNOSTYCE MASZyny INDUKCYJNEj ZASILANEj Z FAŁOWNIKA NAPIĘCIA

ADVANTAGES OF THE MOVING RMS CURRENT SIGNAL IN DIAGNOSTICS OF INDUCTION MOTOR SUPPLIED BY VOLTAGE INVERTER

Abstract: Diagnostics of induction motor is usually executed on the basis of the motor phase currents signals. The harmonic contents of the current signal are taken into account. The current harmonic components of the motor to be destroyed have relatively small amplitudes, what outcomes many problems connected with interpretation of analysis results. The most of papers referred to diagnostics of induction motors available in literature are involved to motors supplied by sinusoidal voltage. The present-day motor drives are using various converter devices with very varied control algorithms for motors control. The output voltage signals contain then many harmonic components, which make difficulties to the methods use. Therefore, the necessity appears to search for quality indicators providing estimation of motor drive state as the integrity, also including the figures of supplying voltage other than sinusoidal. The advantages of using for that purpose the value of true RMS stator current signal are presented in the paper (1). With the constant load torque assumption, the calculated as true RMS value has the constant component I_0. This component is involved with the multiplicity components of the basic stator current component. Depending on the motor conditions the harmonic components frequencies depend on the motor rotation speed. The article presents the ability of uses of the value calculated as true RMS for diagnostics of the motor drive with asynchronous motor and a voltage inverter. The theoretical analyses are supplied by the presentation of labor test results with modeling of chosen damage states.

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CIEPLNE BADANIA SYMULACYJNE STOSOWANE PRZY OPRACOWYWANIU PROJEKTÓW MODERNIZACJI GENERATORÓW SYNCHRONICZNYCH

THERMAL SIMULATION INVESTIGATIONS APPLIED WHEN WORKING OUT MODERNISATION PROJECTS OF SYNCHRONOUS GENERATORS

Abstract: The paper presents a software package for thermal computations of synchronous generators. The programs included in this package are applied when working out modernisation projects of synchronous generators for „ENERGOSERWIS” S.A. They enable carrying out thermal computations of the main construction elements of generators. They were used for working out quite a few modernisation projects of synchronous generators of 30 MW up to 500 MW aiming at increase in the rated power, replacement of the cooling medium (e.g. hydrogen by air), increase in the life and improvement of the weakest construction nodes. The use of the developed computer programs is illustrated by the example of
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NOWOCZESNE METODY DIAGNOSTYKI IZOLACJI SILNIKÓW I GENERATORÓW WN

CONTEMPORARY DIAGNOSTIC METHODS OF HV ROTATING MACHINE INSULATION

Abstract: This paper presents degradation mechanism of epoxy-mica-glass insulation and influence of service conditions on kinetics of this mechanism. But the most important factor here is production quality. Basics of dielectric spectroscopy in time and frequency domain were described and application of this method for estimation of HV insulation condition. Research conducted on insulation models showed that good indicators of insulation condition are value of charge and time of relaxation in low frequencies range. There was given an example of FDS measurements application for estimation of quality of technology in postproduction tests. Other examples showed classification of HV motors and generators insulation with various periods of service based on FDS method and voltage ramp test. Relaxation processes analysis in low frequencies domain in epoxy-mica-glass insulation has corroborated high conformity of laboratory measurement results of insulation samples with service tests of HV motors. This method is very accurate and allows to identify defective production technology and insulation aged in service.

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NOWE PODEJŚCIE DO PROBLEMU ZAKŁÓCEŃ W SIECIACH PRZEMYSŁOWYCH NISKIEGO NAPIĘCIA

NEW APPROACH TO DISTORTION IN LOW VOLTAGE INDUSTRIAL NETWORK

Abstract: This article describes problem caused by low insulation resistance and methods continuous monitoring of residual currents in earthed industrial networks or insulation resistance in unearthed networks. Especially phenomenon caused by energoelectronic converters are taken into account, like DC leakage currents, large earth capacitances, high harmonic distortions. Methods are described separately for earthed (TN, TT) and for unearthed (IT) systems. Additionally article shows possibility of continuous insulation condition control of unsupplied motors, to keep them on standby.

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WPŁYW WARUNKÓW ŚRODOWISKOWYCH NA STARZENIE MAGNESÓW TRWAŁYCH Nd-Fe-B

APPLICATION PROPERTIES OF PERMANENT MAGNETS Nd-Fe-B

Abstract: The paper presents results of corrosion wear of bonded and sintered hard magnetic materials Nd-Fe-B and magnets covered by protective polymer, lacquer and metal coatings. Corrosion tests were made in the water and in 5% NaCl solution environment. It was found that the bonded magnets with the polymer matrix demonstrate better corrosion resistance than the sintered magnets. Employment of the protective coatings on the Nd-Fe-B bonded magnets surfaces may feature the effective protection of the substrate material from the corrosive action of the aggressive agent. Analysis of the surface topography of the deposited protective coatings makes it possible to determine coating defects resulting from the action of the aggressive agent. The best protection from the corrosive environment is provided by the polymer coatings. Lower corrosion protection by protective coating was found in the case of sintered magnets. The corrosion damage process of magnets covered with the protective coatings starts in the coating failure location and is connected with the further damage proceeding both into the material and on its surface.
Abstract: Authors of articles have concentrated on correct manner of selecting in “few couple” highly energetic permanent magnets synchronous generator with asynchronous motor at different states of conditions of loads general working. Engine has to be included on exit clamps of generators directly. Work relied on assignment of parameter scheme electric asynchronous motor and parameter of scheme electric generator, to next connect in one scheme electric. It carry malingering of work of match in states established at different moments of loads of asynchronous motor and at different rotary speed principle of stability of magnetic flow approximately = U/f const. Stability of magnetic flow, because impose synchronous generator construction of machine supplying, i.e. synchronous generator with magnets (change of voltage in change of frequency – change speed rotary). Range of test execute, which have confirmed accepted employ methodics of procedure.

Abstract: This article describes types of wind turbines, their constructions, advantages and disadvantages. It presents simplify algorithm of wind – mills calculations and comparison: yacht – turbine JSW – 800 – 12 BOBRME “Komel’s“ production and VAWT constructions prototypes. The laboratory tests were performed of both type turbines (3 sets). Figure 6 presents results of tests of power density vs. wind speed of described turbines. The paper describes possibilities of wind – mill exploitations.