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Electrical Engineering Institute Nikola Tesla
Electrical Measurements Department

Scientific field (Frascati Manual)

Organic chemistry

Analytical chemistry

Electrical and electronic engineering

Other engineering and technologies

Brief description of expertise

Diagnostic tests of rotating machines, HV power and instrument transformers, cables. Analysis of mineral insulating oils, vegetable oils applied for electriacl purposes . Accuracy testing of current and voltage transformers Diagnostic field tests and measurements of HV electrical equipment are performed within the Program of preventive testing and control or as part of the complex diagnostic of HV equipment condition. ON-LINE remote monitoring of power transformers and generators. Research and Implementation of new test methods in electrical eqipment testing practice – active participation in preparation and development of international and domestic standards and technical recommendations as a member of Working Groups within International Council on Large Electric Systems (CIGRE) and other standardisation bodies Development of technical solutions for power quality analysis. Application of contemporary solutions for energy efficiency improvement in industry. Magnetic Monitoring of Electrical Rotational Machines Protective relaying: selectivity studies, functional testing

Keywords

Testing , Generator , Transformer , Diagnostic , Power quality, Insulating oil, Measurement of electrical quantities, Protective relaying, Energy management , PCB

Commercial services

Testing of insulating oils of transformers in service
Power and Instrument Transformer Condition Assessment
Research projects and studies in the area of Condition Assessment of Major Power Equipment for Power System Company of Serbia or other customers
Scope of different testing of new (unused) insulating oils as well as insulating paper for domestic and foreing customers
PCB Decontamination
Diagnostic tests on HV rotating machines - stator winding, rotor winding, rotating machine magnetic core tests.
HV power transformer off line diagnostic tests and on-line test.
HV instrument transformers diagnostic tests
Electric cables diagnostic tests
Development of device for measuring the dynamic mass

Development of a device for measuring temperature water-cooled rotor poles in the hydro-power plant
Development of devices for measuring the temperature of the bearing axle wheels of the train
Development of devices for measuring the temperature of transformer oil
Development of devices for measurement and control of very small gass flows
Development of devices for measuring and regulating the temperature of transformer oil samples with accelerated aging
Development of devices for generation of volatge and current signals with adjustable angle between voltage and current
Design and development of software and databases.
Development of acquisition and monitoring software.
Programming of embedded systems.
Development and manufacture the devices for instrument transformers accuracy testing, standard current and voltage transformers, compensated current comparators and standard burdens
Protective relaying: selectivity studies, functional testing.

Realized and current projects

A) NATIONAL PROJECTS

Title	Project ID	Funding source	Duration
Increase of energy efficiency in selected industrial sector through implementation of energy management system in small and medium-sized enterprises	TR33017	Ministry of Education, Science and Technological Development of the Republic of Serbia	2011-2015
Innovation project: Development of multichannel digital system for power quality parameters monitoring at power distribution stations	451-01-00069/2008-01/110	Ministry of Education, Science and Technological Development of the Republic of Serbia	2009
Detail electrical design of solar power plant 999kW in Kladovo for the first and second MW of up-to 4 MW	412013	Solaris Energy	2011-2012

Title	Project ID	Funding source	Duration
Innovation project: Possibilities for application of wireless sensor networks in SMART GRID power systems	451-03-2802/2013-16/79	Ministry of Education, Science and Technological Development of the Republic of Serbia	2014-2015
Increase of power efficiency, reliability and availability of EPS power plants by asserting capability curves of generators and by applying new methods of testing and remote monitoring	TR33024	Ministry of Education, Science and Technological Development of the Republic of Serbia	2011-2015
Development of integrated complex diagnosis of power and measurement transformers conditions	TR 17029	Ministry of Education, Science and Technological Development of the Republic of Serbia	2008-2011

B) INTERNATIONAL PROJECTS

Title	Project ID	Funding source	Duration
Moisture Distribution and Ageing of Vegetable Ester Oils in Transformer Insulation	409442 i 411029	ALSTOM grid, France	2009-2011
Ageing of Ester and Mineral Oils,	413025	ALSTOM Gird, France	2012-2013
On-line monitoring energetskih transformatora T1, T2, T3 i turbogeneratora TVV-200-2A u TE Pljevlja	414087	Elektroprivreda Crne Gore	2014

Applicable research results

PRODUCT

Title	Basic characteristics	Beneficiary
Standard equipment for instrument transformers accuracy testing	National standards in the field of instrument transformer	Directorate for measures and precious metals, Serbia

Title	Basic characteristics	Beneficiary
Laboratory for instrument transformer accuracy testing in the field	Measuring equipment for primary currents up to 3000 A and primary voltages up to 110kV	Elektrostopanstvo, FR Macedonia
Standard current and voltage burdens	Standard current burden from 1VA to 60 VA, standard voltage burden from 1VA to 200VA	Končar – instrument transformers Croatia
Measuring device for instrument transformer accuracy testing	Microprocessor based measuring device for currents 1A and 5A, and voltages 100V, 100V/√3, 100V/3, 110V, 110V/√3, 120V/√3, 200V,, with rated errors for ratio error measurement: less than ± 0,2 % of measuring value ± 0,05 %, and rated errors of phase displacement measurement: less than ± 0,2 % measuring value ± 0,1min	Končar – instrument transformers Croatia
Measuring device for instrument transformer accuracy testing	Microprocessor based measuring device for currents 1A and 5A, and voltages 100V, 100V/√3, 100V/3, 110V, 110V/√3, 120V/√3, 200V, with rated errors for ratio error measurement: less than ± 0,2 % of measuring value ± 0,05 %, and rated errors of phase displacement measurement: less than ± 0,2 % measuring value ± 0,1min	Elektrodistribucija Beograd, Serbia

Title	Basic characteristics	Beneficiary
Measuring device for instrument transformer accuracy testing	Microprocessor based measuring device for currents 1A and 5A, and voltages 100V, 100V/√3, 100V/3, 110V, 110V/√3, 120V/√3, 200V, with rated errors for ratio error measurement: less than ± 0,2 % of measuring value ± 0,05 %, and rated errors of phase displacement measurement: less than ± 0,2 % measuring value ± 0,1min	Elektrovojvodina Novi Sad, Serbia
Measuring device for instrument transformer accuracy testing	Microprocessor based measuring device for currents 1A and 5A, and voltages 100V, 100V/√3, 100V/3, 110V, 110V/√3, 120V/√3, 200V, with rated errors for ratio error measurement: less than ± 0,2 % of measuring value ± 0,05 %, and rated errors of phase displacement measurement: less than ± 0,2 % measuring value ± 0,1min	MINEL-FEPO Zrenjanin, Serbia
Measuring device for instrument transformer accuracy testing	Microprocessor based measuring device for currents 1A and 5A, and voltages 100V, 100V/√3, 100V/3, 110V, 110V/√3, 120V/√3, 200V, with rated errors for ratio error measurement: less than ± 0,2 % of measuring value ± 0,05 %, and rated errors of phase displacement measurement: less than ± 0,2 % measuring value ± 0,1min	Energoinvest rasklopna oprema, Srpsko Srajevo, Republika Srpska
Measuring equipment for automated accuracy testing of current transformers	Standard current transformer up to 2500A standard burden from 1VA to 60VA, measuring device for automated accuracy testing of current transformers	ISKRA AMESI Slovenia and Factory MBS Germany

Title	Basic characteristics	Beneficiary
High accuracy measuring equipment for accuracy testing of current transformers	For currents from 150 A up to 8000A, with ratio error less than □0.002% and phase displacement less than □0.002crad	National Research Council CANADA
Measuring device for instrument transformer accuracy testing	Microprocessor based measuring device for currents 1A and 5A, and voltages 100V/3, 100V/□3, 110V/□3, with rated errors for ratio error measurement: less than ± 0,2 % of measuring value ± 0,05 %, and rated errors of phase displacement measurement: less than ± 0,2 % measuring value ± 0,1min	Elektrodalmacija Split, Croatia

TECHNICAL SOLUTION

Title	Basic characteristics	Beneficiary
The remote control system of hydrogenerator rotor pole temperature	Optical non-contact temperature measurement of rotor pole surfaces using an infrared device that works in on-line intermittent mode	Hydro power plant Djerdap 2
Next generation device for measuring and regulating of transformer oil samples during its accelerated aging	Continuous measurement, control and storage of measurement results of transformer oil samples during process of accelerated aging to a database	Laboratory of chemistry of Eelectrical Engineering Institute Nikola Tesla
The system for on-line monitoring of GSU transformer thermal image	The system of monitoring of GSU transfomer thermal image obtained by simulation of hot spot temperature. This method is considerably cheaper than direct measurement	Thermal electric plant Nikola Tesla B2
Next-generation device for measuring transformer accuracy testing	Microcontroller based device enables improved accuracy, reliability and efficiency of characteristic measurement of measuring transformer under test	Company for measurement transformer production Koncar Zagreb

Title	Basic characteristics	Beneficiary
The integrated information system for GSU transformer complex monitoring	Real-time computer application on a measurement and data acquisition system with the possibility of concurrent access over LAN and Internet	Thermoelectric power plant Nikola Tesla B

Intellectual property

PATENT

Title	Owner	Inventor	Reg. No
1. PROCESS FOR SIMULTANEOUS REMOVAL OF TRACES OF POLYCHLORINATED BYPHENYLS, ANTI-CORROSIVE DESULPHURIZATION AND REGENERATION OF MINERAL INSULATING OILS	Electrical Engineering Institute Nikola Tesla	Jelena Lukić	53510

Licenses

Name	Last name	Type of license	License No
Aleksandar	Nikolić	Supervision	450 8468 05
Aleksandar	Nikolić	Design	352 8196 04
Aleksandar	Nikolić	Design	350 8195 04
Zorica	Milosavljević	Design	351 7604 04
Zorica	Milosavljević	Design	350 7602 04
Zorica	Milosavljević	Supervision	450 5254 04

Industry group (according to "Gazette RS", No. 54/10)

Research and experimental development on natural sciences and engineering

PhD thesis within the unit done according to the industry needs

Name	Last name	Title	Year	Mentor
Jelena	Lukić	Degradation Process of Power Transformer oil-paper insulation and process of refining of degradated mineral insulation oil by means	2013	DUŠAN ANTONOVIĆ

Name	Last name	Title	Year	Mentor
Aleksandar	Nikolić	DIRECT TORQUE CONTROL OF ACURRENT SOURCE INVERTER FED INDUCTION MOTOR	2009	JEFTENIĆ BORISLAV
Saša	Milić	OPTIMIZATION IN SOLUTIONS OF REMOTE TEMPERATURE MEASUREMENTS OF MOVING OBJECTS USING RADIATION OPTIC METHODS	2008	LAZAREVIĆ ZORAN

Staff list within the unit

Name	Last name	Teaching/scientific title
Aleksandar	Nikolić	Research Associate
Nenad	Kartalović	Research Associate
Aleksandar	Žigić	Research Associate
Saša	Milić	Research Associate
Srđan	Milosavljević	Research Assistant
Jelena	Lukić	Research Assistant
Jelena	Lazić	Research Assistant
Nikola	Ilić	Research Assistant
Valentina	Vasović	Research Assistant
Draginja	Mihajlović	Research Assistant
Vladimir	Polužanski	Research Assistant
Blagoje	Babić	Research Assistant
Nikola	Cakić	Research Assistant
Dragana	Naumović Vuković	Research Assistant
Nikola	Miladinović	Research Assistant
Dejan	Misović	Research Assistant

Name	Last name	Teaching/scientific title
Radoslav	Antić	Research Assistant
Đorđe	Jovanović	Junior Researcher
Denis	Ilić	Junior Researcher
Jelena	Ponoćko	Junior Researcher
Ivana	Krstić	Junior Researcher
Neda	Kovačević	Junior Researcher