

DESCRIPTION OF THE PARTICIPANTS

P1

Poznan University of Technology, (acronym PUT),
The Institute of Electric Power Engineering, 3A Piotrowo Str. 60-965 Poznan, Poland

Organisation profile

Poznan University of Technology was established in 1928. Now it has 8 Faculties and about 20 000 students. The Division of High Voltage and Material Science belongs to The Institute of Electric Power Engineering, Faculty of Electrical Engineering. Two professors, seven doctors and eight Ph.D. students work in this Division.

The Institute of Electric Power Engineering is one of the five Institutes of Faculty of Electrical Engineering. It employs 70 researchers, including 8 professors. The Institute has status “Centre of Excellence in Generation, Transmission and Distribution of Electric Energy” within 5FP of EU. The Institute of Electric Power Engineering conducts the scientific work in the following areas: high voltage engineering, including dielectrics science; high voltage measurements; investigation and evaluation of high voltage insulation systems; electrical power systems, including problem of recovery of power system after electric network failure (blackout); distribution network; quality of electric power; electric power automatics; arcing discharges, including vacuum breakdown; utilisation of low-temperature plasma; combined power station systems: steam-natural gas and MHD-steam. The Institute of Electrical Power Engineering organised International Symposium on Discharges and Electrical Insulation in Vacuum – ISDEIV in 1972, International Workshop on High Voltage Techniques in 1998, International Workshop on High Voltage Engineering in 2000, National Symposium on High Voltage Engineering in 1992, 1994, 1996, 1998, 2000, 2002, 2004 and Symposium on Black-out in Power Systems in 2004. For many years the Institute strictly co-operates with the Polish Power Grid Company, Electric Power Distribution Companies, Cable Factories, Transformer Repair and Manufacturing Enterprise. The Division of High Voltage and Material Science has wide international cooperation. All the employees received research trainings, mainly in Germany, as well as in Canada, France and Sweden. The High Voltage Laboratory is visited by many well-known professors. Ph.D. students (from Germany, Ukraine, Russia, Lithuania) receive their research trainings here.

Motivation to be in the project

We would like to work and do research on European level. We intend to exploit our skills and experience combined with knowledge and experience of the best European teams at the field of high voltage engineering and material science.

We have a good experience in power transformer diagnostics obtained in time of realisation the REDIATool project sponsored by European Commission, entitled “Reliable Diagnostics of HV Transformer Insulation for Safety Assurance of Power Transmission System” – NNE5-2001-472. The planned work will be the continuation of research done within REDIATool Project.

We would like to create better work condition for young doctors and Ph.D. students. We also want to keep and improve our good international cooperation. We are convinced that the results of our further research will be successful and will find the applications.

Key persons

Prof. Hanna Moscicka-Grzesiak, works in High Voltage and Material Science Division. She is the head of Ph.D. studies at Faculty of Electrical Engineering, Poznan University of Technology. She is a member of IEEE, Polish Academy of Sciences – Commission of Electrical Science, Polish Committee of Electrical Materials. Coordinator of two EU project in 5 FP: “*Centre of Excellence in Generation, Transmission and Distribution of Electric Energy – GETRADEE*” (NNE5-2002-15, 01.2003-12.2005) and “*Reliable Diagnostics of HV Transformer Insulation for Safety Assurance of Power Transmission System – REDIATool*” (NNE5-2001-472, 02.2003-01.2006). She was (or is) the coordinator of 11 projects financed by Polish State Committee for Scientific Research. She has finished studies at Technical University of Wroclaw (Poland), received Ph.D. in electrical engineering in 1968, and habilitation in 1973 from the same University. In 1986 she received the title of professor and in 1992 the title of full professor. From 1962 she has been working for Technical University of Poznan (Poland). She was a visiting researcher in the University of Rome (Italy) and University of Strathclyde (Glasgow, Scotland). She is an author and co-author of four technical books, and about 190 papers. Under her supervision 16 Ph.D. thesis have been completed.

Dr hab. eng. Krzysztof Siodla is currently the Head of High Voltage and Material Science Division of the Institute of Electric Power Engineering, Poznan University of Technology, Poznan, Poland. He received the M.Sc and Ph.D. degrees in electrical engineering from Poznan University of Technology in 1980 and 1989 respectively. In 2005 he received Doctor Habilitatus degree from Poznan University of Technology. Author and co-author of 4 books and 90 scientific publications. He had a post-doctoral fellowship at the University of Manitoba, Winnipeg, Canada in 1991 and also worked as visiting professor at this same University in 2001. He visited and delivered lectures at University of Magdeburg, University of Munich and Stuttgart University, Germany. He is a Technical Manager of international Project in 5 FP: “*Centre of Excellence in Generation, Transmission and Distribution of Electric Energy – GETRADEE*” (NNE5-2002-15, 01.2003-12.2005) sponsored by European Commission in Brussels. He also worked in EU international projects Copernicus, Jean Monnet and “*REDIATool – Reliable Diagnostics of HV Transformer Insulation for Safety Assurance of Power Transmission System*” (NNE5-2001-472, 02.2003-01.2006). Member of CIGRE Working Group D1.02 “High Voltage and High Current Test and Measurement Technique”. Participated in many national and international conferences.

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AREVA Energietechnik GmbH (acronym AREVA)
Rheinstr. 73, D-41065, Moenchengladbach, Germany

Organisation profile

AREVA Energietechnik GmbH is the German subsidiary of AREVA T&D, the transmission and distribution branch of the French AREVA group. The German AREVA TRANSFORMER SERVICE unit provides service on power transformers with a permanent key staff of 25 professionals in Germany (with two operational sites – Moenchengladbach and Berlin) and in Central, Northern and Eastern Europe and Western Asia. Essential parts of the transformer service business – total 10 M Euro in sales – are condition assessment, preventive and curative actions, small and medium site services, repairs and overhauls of power

transformers, which are usually being conducted in the premises and with the support of the AREVA power transformer factory in Moenchengladbach, the former AEG - Schorch Transformatoren GmbH.

In 2004 the AREVA group has generated sales of 11.5 Bil Euro with a total of 75 000 staff in more than 100 countries. AREVA is manufacturing power transformers up to 1500 MVA and 525 kV in Moenchengladbach. AREVA is providing service on all power transformers within the premises of their customers. There is an increasing demand for on-site services, moisture reducing services and life-extension services of any kind.

Motivation to be in the project

For more than 10 years AREVA is providing different services for drying power transformers, ranging from drying in the factory, through off-line oil regeneration to on-site drying with mobile by-pass systems. The ageing fleet of installed transformers in the field adds to the reduction of installed redundancies, often resulting in accelerated ageing. Customers tend to use their old transformers longer than ever before, logistics and transport limitations require that transformers shall be dried or even repaired on-site. We have solid experience of drying transformers with on-line by-pass methods in the field. For transformers above 100 MVA this may be very time-consuming and not sufficient if i.e. after repairs the moisture ingress is too high. Commonly used technologies to dry transformers on-site – oil treatment, oil spray, LFH, and others do not achieve a sufficiently homogeneous drying regeneration of the active part. The MVPA process is intended to achieve a considerably improved homogenous drying and regenerating result without partial overheating or other negative side-effects of that kind, which is needed for a long-term survival of the regenerated or repaired transformers on-site. Together with mobile on-site workshops this new drying and regeneration service shall provide an important milestone in transformer service to improved availability. AREVA intends to provide this mobile on-site life-extension service together with regional service entities, especially in Eastern Europe and we are looking very much forward to a fruitful co-operation with the universities and affiliated service companies to increase availability of the installed transformers.

Key persons

Benedikt Schmitz received his diploma Dipl.-Ing. degree from the Technische Universitaet Muenchen in 1987. He joined ALSTOM / AREVA in 2002 at Paris headquarters where he defined the service strategy on power transformers for AREVA's worldwide operation. Then he moved to Moenchengladbach, Germany, in August 2004 to take over the operational responsibility of the Transformer Service Business Unit. From 1997 to 2002 Mr. Schmitz was developing the worldwide sales of innovative transformer drying technologies along with new and improved methods of transformer diagnostics, in particular tools to determine moisture in paper contents during operation. From 1991 to 1997 he was in charge of energy trade – solid fuels for a privately owned trading house. Prior to that, and since his studies, he worked as a management consultant in the energy business. Mr. Schmitz is a private member of CIGRE, participating in Working Group B3-06. Furthermore he is an international councillor of the Fossil Fuel Foundation of Africa which is predominantly conducting training and educational sessions for young engineers. Mr. Schmitz has published several papers on the service and diagnostics of power transformers and he has been holding presentations of those in several conferences including EPRI.

Andreas Naundorf received his diploma Dipl.-Ing. degree from FH Bohum, Electrical Engineering Department in 1999. He joined the transformer manufacturer – Alstom Schorch in 2000 where he developed new manufacturing technologies for windings. In 2003 he joined the service department where he is managing the after-sales and site service activities.

P3

Chalmers University of Technology, (acronym CHALMERS),
Department of Materials and Manufacturing Technology, Hoersalsvaegen 11,
SE-412 96 Gothenburg, Sweden

Organisation profile

The University was founded in 1829 following a donation by William Chalmers. Chalmers became an independent foundation on July 1, 1994. Around 12 600 people work and study at Chalmers, including about 10 300 students. Each year around 340 Ph.D. and Licentiate degrees are awarded as well as 1180 M.Sc. Eng. degrees. Chalmers is involved in approximately 140 industrial and educational projects within the EU. Research at Chalmers ranges from mathematics and natural sciences through to engineering, industrial sciences and community development.

The department of Materials and Manufacturing Technology at Chalmers consists of six research groups: surface and microstructure engineering, materials technology, polymeric materials and composites, manufacturing technology and advanced non-destructive testing and high voltage engineering. Other parts of electric power engineering at Chalmers are represented through research groups belonging to the Department of Energy and Environment: electrical machines and drives, power electronics and power systems.

The research activities within the high voltage group are oriented mainly to estimation of the insulation system conditions and reliability. This includes ageing studies of changes in the insulation state due to the short-term and long-term electric and environmental stresses under realistic conditions in the laboratory and at the field conditions. Also modelling of electrical properties of insulation, including charge transport in gaseous, liquid and solid insulating materials, and elaboration of new diagnostic methods are dealt with. Emphasis is put on polymeric insulators, gas-insulated systems, insulation exposed to high frequency stresses, insulation of large rotating electrical machines and transformers.

Motivation to be in project

From many years we have been engaged in investigation of high voltage power transformers. We are experienced in modern techniques of maintenance of power system equipment. We are very active on international forum of CIGRE in the scope of insulating material science, as well as power transformers. This experience will help us to implement new standards elaborated on the basis of results obtained in the proposed project. The planned work will be the continuation of research done within *REDIATool* project sponsored by European Commission on “*Reliable Diagnostics of HV Transformer Insulation for Safety Assurance of Power Transmission System*” – NNE5-2001-472. The results are going to be disseminated among the Swedish and other European power companies for using them in practice.

Key persons

Stanislaw Michal Gubanski, full professor Chalmers University of Technology. Member of CIGRE and Convenor of the CIGRE Task Force (15.01.09) on Evaluation of Dielectric Response Methods for Diagnostics of Power Transformers (since 1998), chair of Nominations Committee of the IEEE Dielectrics and Electrical Insulation Society, chairman of the International Advisory Committee of the International Conference on Advances in Processing, Testing and Application of Dielectric Materials (APTADM). 1973-1976 a student at the Institute of Electrical Engineering Fundamentals, Technical University of Wroclaw in Poland, 1976-1979 lecturer at the Electrical Engineering Department in the same University, 1976-1977 research fellow at the School of Electronic Engineering Science, University College of North Wales, Bangor, UK, 1983-1985 senior lecturer at the Federal University of Technology, Bauchi, Nigeria, 1985-1989 senior lecturer at the Electrical Engineering Department, Technical University of Wroclaw, Poland. 1989-1996 associate professor at the Department of Electric Power Engineering of the Royal Institute of Technology, Stockholm, Sweden, since 1996 a professor in High Voltage Engineering at the Department of Electric Power Engineering (since 2005 Department of Materials and Manufacturing Technology) of the Chalmers University of Technology, Gothenburg, Sweden.

Hans Jörgen Mikael Blennow, Ph.D., Assistant Professor Chalmers University of Technology in High Voltage Engineering. In 1993-1995 he was a Ph.D. student at the Department of High Voltage Engineering at Chalmers University of Technology. In 1996-2001 he was a system engineer in Kockums Submarine Systems AB, Malmoe, Sweden. In 1997-2000 he was a Ph.D. student in Department of Electric Power Engineering at Chalmers University of Technology in Gothenburg, Sweden.

Yuriy Viktorovich Serdyuk, Ph.D., Assistant Professor in High Voltage Engineering, Chalmers University of Technology. In 1980-1986 a student at Department of Electrophysics and High Voltage Engineering, National Technical University of Ukraine "Kiev Polytechnic Institute", Kiev, Ukraine. 1986-1996 – research engineer, researcher and later a senior researcher in the Institute of Electrodynamics of the National Academy of Sciences of Ukraine, Kiev, Ukraine. In 1995 he received a Ph.D. degree from the National Technical University of Ukraine. 1996-1997 – research engineer at R&D High Voltage Laboratory, ABB High Voltage Technologies Ltd., Zurich, Switzerland. 1999-2004 – visiting researcher and later a Ph.D. student at the Division of High Voltage Engineering, Chalmers University of Technology, Gothenburg, Sweden. In 2004 received a Ph.D. degree from Chalmers University of Technology and since that time an Assistant Professor in High Voltage Engineering.

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Manufacture & Repairing Enterprise "Energetyka Czerwonak", (acronym CZERWONAK), 83 Gdynska Str. 62-004 Czerwonak, Poland

Organisation profile

For over 50 years The Enterprise "Energetyka Czerwonak" manufactures and repairs electrical power equipment used by electrical power utilities and industrial users. They specialise in repairing electrical motors, transformers and generators. They are able to repair power transformers of power rating up to 75 MVA at its plant, and up to 250 MVA on-site.

Typical operations are as follows: manufacturing of radiators; manufacturing of valves for radiators; manufacturing of new windings with paper, fibreglass-epoxy and nomex insulation; processing of insulating oil; vacuum drying of power transformers; transportation and moving of the transformers at substations; repair of on-load tap changers; manufacturing of control and protection equipment for transformers; technical expertise; technical analyses and measurements.

They can perform physical and chemical analyses of the transformer insulating oil, including gas chromatography. They are able to carry out all electrical measurements with the voltage up to 400 kV. Company co-operates with Poznan University of Technology, The Institute of Electric Power Engineering in Poznan and “Energopomiar” Company in Gliwice.

Motivation to be in the project

As an enterprise that has been doing repairment of power transformers we are interested in new methods for improving the insulation state of high voltage equipment. By the participation in the project we want to grasp the general use of aged transformer insulation drying method.

We participated in the project sponsored by European Commission on “Reliable Diagnostics of HV Transformer Insulation for Safety Assurance of Power Transmission System” – NNE5-2001-472. The knowledge on status of power transformers insulation, obtained in time of REDIATool project realisation, allows us to continue the work on transformer insulation drying. The possession of equipment that will enable to service big power transformers on-site will improve the stability and safety of power system in Poland.

We also want to keep and improve our good international cooperation, as well as increase the quality of our service done for high voltage power transformers.

Key persons

Electrical Engineer Stanislaw R. Neumann, in years 1971-1976 studied at Poznan University of Technology in Poznan, Poland. Since 1993 he has been a Director of Electrical Department of ZPREP “Energetyka-Czerwonak” SA.

Electrical Engineer Antoni Filipowski, in years 1963-1968 studied at Poznan University of Technology in Poznan, Poland. Since 1990 he has been a General Director, President of Management of ZPREP “Energetyka-Czerwonak” SA.

P5

Delft University of Technology, (acronym DELFT),
Faculty of Electrical Engineering, Mathematics and Computer Science, HV Technology and
Management, 4 Mekelweg Str. 2628 CD Delft, The Netherlands

Organisation profile

Founded in 1864, Delft University of Technology is the oldest, largest, and most comprehensive technical university in the Netherlands. With over 13 000 students and 2 100 scientists (including 200 professors), it is an establishment of both national importance and significant international standing. Renowned for its high standard of education and research, the University collaborates with other educational establishments and research institutes, both

in the Netherlands and overseas. It also enjoys partnerships with governments, branch organisations, numerous consultancies, the industry, and companies from the small and medium business sectors.

The group High Voltage Technology & Management (HTM), which will be involved in the work, is part of the Faculty of Electrical Engineering, Mathematics and Information Technology of Delft University of Technology, department Electrical Power Engineering.

TUD is equipped with a large scale high voltage laboratory suitable for testing and experimenting with full-size power equipment under severe conditions, e.g. electrically up to 600 kV DC voltage, 1.5 MV AC voltage and 4 MV impulse voltage. The measurement facilities include a diversity in high quality instrumentation for low level electrical measurements and characterisation of dielectric materials. TUD has direct access to a variety of numerical modelling tools. An accurate numerical network model verified with experimental data for high temperature superconducting tapes and electric power devices (such as for instance 1 MVA HTS coil) will be available for this project.

The group “High Voltage Technology Management” (HTM) is involved in the following fields of activity relevant to the DRYTRANS project:

- design of constructions for high and medium ac/dc voltages, including field calculations,
- reliability of electrical insulation systems, including aging investigations,
- diagnostic methods for AC and DC equipment, in particular partial discharge based,
- decision support systems, knowledge rules and asset management of large infrastructures.

Most HTM projects are research contracts with the electric power industry, utilities, governmental national funds and European funds. These co-operations constitute considerable practical experience and access to field applications and evaluations. In particular, is the participation of HTM in the FP5 project number NNE5-2002-00889, “Benefits of HVDC Links in the European Power Electrical System and Improved HVDC Technology”.

At the stage of practical knowledge transfer, the HV lab of TUD offers a gateway to industries in the Netherlands and in Europe. A good co-operation in R&D exists for many years. Among others, national partners as Pirelli Cables & Systems (Delft), Siemens, SMIT Transformers, KEMA and other electric power and utility companies have expressed yet potentially and in future larger interests in assessing the feasibility, testability and reliability of HTS materials, designs and appliances.

Motivation to be in the project

The mission of HTM group as internationally recognized knowledge centre (e.g. host of the XIII International Symposium on High Voltage Engineering) is

- 1) to raise the level of scientific knowledge of:
 - sustainable and reliable solutions in the area of high voltage technology and management,
 - modelling of the overall performance of intelligent HV applications, including their economical, environmental and social aspects,
- 2) to facilitate, stimulate and train students in performing innovative research with high societal relevance,
- 3) to provide technology transfer and knowledge valorisation with utilities, industries and research institutes in the field of large infrastructures.

Therefore the participation on the DRYTRANS project fits excellently in to the future activities of the HTM group on the one hand and the HTM participation can be valuable

contribution to systematic progress in improving the quality of the power supply on the other hand.

Key persons

Dr. Johan J. Smit will be the person responsible on this project. He is a full-time professor and program director of High Voltage Technology and Management Group. He obtained his Ph.D. in 1979 in the field of cryogenic magnetism, using superconducting and pulsed 50 T coils at the Kamerlingh Onnes Laboratory. Next he was employed in different research/management functions during two decades at KEMA's power testing, consultancy and engineering company, Arnhem NL. He represents the Netherlands in the Technical Committee of IEC 98 on Electrical Insulation Systems and in the period 1998-2004 he was the international chairman of CIGRE Study Committee D1, Materials and Emerging Technologies. He is chairman of the CIGRE Joint Advisory Group "Impact of HTS on the design and operation of transmission systems". He is chairman of the board of KSANDR organisation.

Dr.hab.ir. Edward Gulski (IEEE Senior member) is associated professor responsible for research and education in the field of insulation diagnosis of HV components and Asset Management. In 1991 he received his Ph.D. degree from Delft University of Technology. In 2004 he received his Doctor Habilitatus degree from Warsaw University of Technology. He is author of two books and (co)-author of 200 scientific publications. He is member of the Executive Board of KSANDR organisation and responsible for research in education. He is chairmen of two CIGRE Task Force D1.02.03 "PD measurement" and convenor of the CIGRE Working Group D1.17 "HV asset condition assessment tools, data quality, and expert systems", member of CIGRE Working Group "Reliability of Maintenance" and Member of IEEE Working Group 400.3.

Further, **Ph.D. student/researcher** will be appointed on the project, on the modelling, data-base development, implementation and validation.

P6

Institute of Power Engineering, Transformer Division, (acronym IEN),
Kopernika Str. 56/60, 90-553 Lodz, Poland

Organisation profile

Transformer Division of Institute of Power Engineering (IEnOT) was established in 1965 as a Research Centre for Polish transformer industry needs. Division activity has been focused mainly on transformer design, technology and testing problems. All the biggest transformers manufactured in Poland at that time as well as a number of series of distribution transformers were designed and tested by IEnOT engineers.

After 1989 the activity profile was extended by close cooperation with industrial utilities, power plants and local grid owners as well as Polish Power Grid Co.

Now, in detail, IEnOT is dealing with: transformer test and measurements – commissioning, periodic, post-failure and special diagnostics; diagnostics of the transformer condition, connected with recommendation regarding further maintenance and operation, economic analysis – repair, refurbishment, replacement options; determination of a

transformer repair / refurbishment scope; on-site oil processing performed off-line or on-line by means of movable Oil Treatment Units UZO, manufactured by IEnOT; on-line monitoring & diagnostic systems supported by expert systems, including wireless data transmitting mode; post-failure expert opinions for needs of Assurance Companies; attestation and certification of electrical equipment, design and consulting of transformers and reactors – power and special (e. g. traction, furnace); power-electronic systems; harmonic filters; insulation systems for low, medium and high voltage; magnetic and heat problems, including heavy leakage flux effects; screening problems; noise and vibration problems.

High technology IEnOT products are: movable Oil Treatment Units UZO; complete („on key”) computer-aided technological installations, such as installations for transformer drying and impregnation (vapour phase type for large power transformers and vacuum type with LFH for distribution transformers), and for oil treatment; computer-aided control and measurement systems; transformer test station with computerised systems for automatic controlling of test voltage and registration of results; special transformers and inductors – e. g. high frequency, impulse etc.; non-typical power-electronic equipment (filters, drivers); transformer accessories: current transformers installed on transformer bushings, oil level and oil flow indicators, overpressure and cut-off valves; special apparatus and equipment: water content in oil analysers; DC and AC supply units. All our products / services conform to ISO-9001 Certification Standards.

Now IEnOT has 30 employees, including three doctors.

Transformer Division is the part of Institute of Power Engineering with headquarters located in Warsaw. The Institute consists of 8 Divisions (Mechanical Engineering, Thermal Engineering, Electrical Engineering, Transformer, Ceramic, Informatics and Automatic Control, Production). It employs near 400 workers and researchers, including 6 professors. The Institute has status Centre of Excellence CENERG within 5FP of EU.

IEnOT was co-organiser of a number of national and international conferences, among others periodic (every two years – 1997, 1999, 2001, 2003, 2005) International Conference TRANSFORMER under auspices of Study Committee A2 of CIGRE. It co-operated with EPRI (USA), AdTranz/Bombardier (Sweden), Europe Copper Institute, Prophet. Moreover Technical Committee Secretary for Power Transformers of Polish National Committee for Standardisation is located within Transformer Division and co-operates with IEC TC14 as well as with CENELEC TC 14. For many years IEnOT engineers have been and still are active on SC 12 (now A2) of CIGRE area (SC members, Working Group members). More information may be found on website – www.ienot.com.pl.

Motivation to be in the project

We would like to work and do research on European level. We intend to use our wide experience in the field of transformers combined with knowledge and experience of the best European teams at the field of high voltage engineering and material science. We have been manufacturing a wide variety of high voltage equipment for power distribution purposes, as well as measuring and service devices.

We also want to keep and improve our good international cooperation. We are convinced that the results of our further research will be successful and will find the applications.

Key persons

Dr Marcelli Kazmierski, formerly Division Director, currently is the scientific advisor. He has more than 40 years experience in transformer problems, including: design

office (large power transformers, focused mainly on leakage flux and heavy current problems, distribution transformers, furnace and rectifier transformers, computer programs), laboratory and Test Station (Head of Leakage Flux Lab in the past; HV Lab; acceptance tests; special tests; model tests, including full scale; measuring systems), on-site tests (diagnostic, periodic, commissioning); authority for their supervising, valid in Polish network, R&D activity (Head of R&D Dept. in the past, new measurement methods and systems, on-line and monitoring systems). Author and co-author of more than 100 papers, including manuals, such as Maintenance Manual of Power Transformers (in Polish), 2001 and Guide for Life Management Techniques for Power Transformers, by CIGRE WG A2.18, 2003. In 1988÷2000 member of CIGRE SC 12 (Transformer) on behalf of Polish National Committee, also member of some Working Groups (Sound Intensity Measurement Method, Life Management Techniques for Power Transformers, Economic of Transformer Management). He was the coordinator of the project financed by Polish State Committee for Scientific Research, entitled “Hot-spot measurement within transformer windings by means of fibre optic system”. In 1974 – Ph.D. degree.

Dr Ivo Pinkiewicz, received his Ph.D. degree in 1977. He has great experience in transformer problems, including: Laboratory and Test Station (HV Lab; Head of Heating Lab; acceptance tests; special tests; model tests, including full scale; measuring systems), on-site tests (diagnostic, periodic, commissioning); authority for their supervising valid in Polish network. Transformer technology problems (Head of Technology and Experimental Production Dept.; transformer drying technology; oil processing, including on-site and on-line). R&D activity (new measurement methods and systems, on-line and monitoring systems). Author and co-author of approximately 30 papers, including national and international conference reports. In 1973 he received United Nations Fellowship in FERRANTI Transformer Factory in England. In 1976 he graduated Licence Training in HITACHI Transformer Factory in Japan. He is a Chairman of TC 79 entitled “Power Transformer” of Polish National Committee of Standardisation. He is also a member of IEC TC 14, affiliated member of CENELEC SC 14 “Power Transformers”. From year 2000 he is a member of CIGRE SC A2 (Transformer) on behalf of Polish National Committee and member of Working Group A2 24, entitled “Thermal Performances of Power Transformers”.

P7

Universitaet Stuttgart (acronym USTUTT),

The Institute of Power Transmission and High Voltage Technology, Pfaffenwaldring 47,
D-70569 Stuttgart, Germany

Organisation profile

The Institute of Power Transmission and High Voltage Technology has been founded in 1955 at the Technical University of Stuttgart. Their main research areas are dealing with the reliability of the electrical power supply and its improvement. Wide range of research topics e.g. the dielectric strength of electrode arrangements in gas-insulated substations, the protection of power lines, transformers and bus-bars using microcomputer algorithms, intelligent and new methods for planning of electrical power networks.

Since more than 10 years the monitoring of different high voltage devices – especially power transformers and gas insulated substations (GIS) – is one of their main research topics. 50 % of our scientists and engineers are developing methods in order to estimate the condition and lifetime of the equipment. Keeping e.g. a power transformer in service for some

additional years – of course without loss of a reliable supply with electric power – will shift an investment and saves millions of EURO. Control devices with adapted software algorithms will be included into the power system management and will allow an economic service and maintenance of the important and expensive components in the power system.

Motivation to be in the project

The investigation of drying processes for power transformers is in the centre of our research. In the past we have investigated different measurement techniques to determine the water content of the oil/paper insulation system. Furthermore the effect of moisture on the ageing behaviour is a topic of our research work. Due to the high age of the transformer population in Germany the proposed research project is of increasing importance. It combines all these basic topics and therefore it will be a research work based on our experience and going one step further in the future.

In addition we have had a very effective research cooperation with the Polish universities of Poznan and Wroclaw over the last 20 years. During this time the exchange of researchers and ideas has led to a constructive cooperation and a fundamental confidence to each other. We would like to strengthen this cooperation.

Key persons

Prof. Dr.-Ing Stefan Tenbohlen received his Diploma and Dr.-Ing. degrees from the Technical University of Aachen, Germany, in 1992 and 1997, respectively. 1997 he joined AREVA Schorch Transformatoren GmbH, Moenchengladbach, Germany, where he was responsible for basic research and product development and in this function working in the field of on-line monitoring of power transformers. From 2002 to 2004 he was the head of the electrical and mechanical design department. In 2004 he was appointed to a professorship and head of the Institute of Power Transmission and High Voltage Technology of the University of Stuttgart, Germany. He is member of the German committee of CIGRE A2 (power transformers), several international working groups and the German Power Engineering Society VDE-ETG FB Q2 (Materials, Electrical Insulation and Diagnostics).

Dr.-Ing. Ulrich Schaerli Institute of Power Transmission and High Voltage Technology at the University of Stuttgart, involved in teaching power systems to students as head of the power transmission department and responsible for financial and administrative matters. Member of VDE and author of 15 papers. Co-ordinator for EU-project ICOP-DISS-2140-96 SIPOSTO (1.1.1997-31.12.1998). Graduated in 1986 from University of Stuttgart with a Dip.-Ing. degree. In 1992 he finished his Ph.D.

P8

Research Development and Testing National Institute for Electrical Engineering (acronym ICMET)

144, Calea Bucuresti, 200515 Craiova, Romania

Organisation profile

ICMET Craiova is Research, Development and Testing National Institute for Electrical Engineering, 100% state-owned.

Its activity started in 1974 as Research & Development Center of Romanian Electric Power Companies Holding (Electroputere) with the headquarters in Craiova.

After 1989, the Research Center became independent and passing through successive changes, since 1999, it has become National Institute, the most important Romanian R&D structure in the domain, under the aegis of Economy and Commerce Ministry.

At present, ICMET activity is focused on the following main directions: high voltage, high current testing & certification for electric power equipment, low voltage, safety and EMC tests including power quality assessment, calibration for mechanical and electrical measuring quantities, on-site test and assessment of power transformers, diagnosis and monitoring of power and instrument transformers, development and small production of measuring systems based on advanced electronic circuits.

These activities are performed within the framework of two departments: Laboratory Department and Electric Drives and Special Electromechanical Department.

The test laboratories are nationally (RENAR – Romanian Accreditation Association) and internationally (DATech, VDE Global Services) accredited for type and development tests on electric power equipment up to 400 kV rated voltage, with customers from Romania and abroad (about 50 companies).

ICMET has three DKD accredited calibration laboratories (high force, high voltage and electromagnetic fields).

ICMET has implemented and maintains a quality management system which fulfils the requirements of EN ISO 9001:2001.

ICMET has 300 employees, many of which are high skilled reserchers.

For many years specialists of ICMET have been and still are active in IEC Technical Committees (TC 14 –Power Transformer, TC 36 – Insulator, TC 42 – High Voltage Testing Techniques), CIGRE Working Groups and Task Forces (WG A2.25 – Bushing Reliability, WG A2.26 Mechanical condition assessment, TF A2.27 – Recommendations for monitoring facilities, WG A3.12 – Circuit breaker controls, WG D1.33 – High voltage test and measuring techniques) and members in some of IEEE societies.

ICMET has organized the international symposium “High Current and High Voltage Tests, Measurements and Certification of Electrical Equipment” and the tutorial “Transformer Condition Assessment Maintenance and Diagnosis” under the auspices of CIGRE WG D1.33 (2005, Eforie Nord).

It was co-organizer to all the editions of the international conference ICATE – International Conference on Applied and Theoretical Electrotechnics; together with ACER – Romanian EMC Association (created in 1997 and having the headquarters at ICMET), ICMET organized all the editions of the symposium SICEM (Interdisciplinary Symposium for EMC).

ICMET cooperated through different agreements and technical cooperations with PTB Braunschweig, TU Karlsruhe, NTUA Athens, TU Eindhoven, TU Berlin, IPH Berlin.

ICMET participated in many international programs, among which the most representative are: **COST 261** “ Electromagnetic Compatibility (EMC) in Distributed and Complex Systems”, **UNESCO-RENEC** “The Development of Testing Methods in High Power Laboratory”, **USAID** “Efficient Utilization of Energy, Minimum Climatic Changes.”

More information about ICMET may be found on website – www.icmet.ro.

Motivation to be in the project

For several years, we have been involved in monitoring the behavior of the power transformers in operation in the Romanian power grid. The transformer population of Romania is aged but their replacement would not be economically motivated in many cases if a system enabling their on-site rehabilitation would exist.

We have a good and long experience in insulation condition diagnosis for these transformers by measuring the partial discharges in combination with dissolved gas analysis, water in oil content, etc.

There is also experience in assessing the mechanical condition of these transformers by non-intrusive methods (off- and on-line). Lately, due to on-site refurbishment attempts the control and recovery of the axial clamping force of the windings following the drying process got a special importance these forces being key points for the short-circuit withstand capability of the transformers repaired in this way.

Therefore, it arises the need of a direct method for axial clamping force measurement able to be applied on any transformer with no constructive changes. In order to implement it, we have the necessary experience both in the field of modern sensorics and in its operation in high voltage insulating structures.

In the European consortium formed within the frame of this project there is the guarantee that on-site transformer drying has certain chances of success due to solving both the insulation recovery as well as the mechanical condition recovery for the transformer windings.

Key persons

Prof. Dr. Andrei MARINESCU is currently Scientific Manager of Research, Development & Testing National Institute for Electrical Engineering ICMET Craiova. He received his Ph.D. degree in 1977 in theoretical electrical engineering at Polytechnic Institute, Bucharest.

He has a great experience in power transformer field: participated at testing and certification of the first Romanian 400kV power transformers and switchgears, developed a New Method for Power Transformers Switching Impulse Test: CIGRÉ Report 12.10 Paris (1980), Developed and implemented Static Switch Use to Generate Switching Impulses to Test Power & Instrument Transformers on site Using Electromagnetic Induction (1988-1992).

He was visiting scientist at UNI - Karlsruhe, IEH (Prof. A.J. Schwab) in 1992 and in 1996 and participated in NATO Research Fellowship at UNI – Patras, Greece in 1999.

He was Secretary of Romanian IEC TC 14 “Transformers” 1980-1990 ; Chairman of Romanian IEC TC 8 “Switchgears & Instrument Transformers & High Voltage” since 1990; Romania’s representative in IEC TC 42 "High Voltage" (1996-2002); IEEE member since 1993, PES&EMC Societies; CIGRÉ member since 1992; Romania’s representative in CIGRE SC 12 (now A2) “Transformers”(1998-2006); Member of CIGRE working group WG 33-03 (now WGD1.33) "HV Measurement and Testing Technique" since 1996.

He is full member of Romanian Academy for Technical Sciences (ASTR), received Traian Vuia Award of the Romanian Academy (1992), Professor and PhD’s degree conductor at Craiova University.

He is author 59 papers published in Scientific Journals, 92 papers delivered at Scientific Conferences, 14 Books/University textbooks and has 14 patents.

Electrical Engineer Dorin Popa is at present Head of the High Voltage Division of ICMET Craiova. He has great experience in the diagnosis of power transformer operational condition. He developed an on-site partial discharge measurement system and an insulation condition assessment technique using the correlation between DGA results and PD measurement results.

In 1980 he had a study stage at the Technical University of Dresden in the field of high voltage testing and in 1997 at Physikalisch - Technische Bundesanstalt (PTB) Braunschweig in the field of high voltage measuring system calibration and also at Fridericiana University

Karlsruhe in the field of Partial Discharge Measurements. He is author and co-author of more than 50 papers including national and international conference reports.