

CENTURY-OLD TRADITIONS - STATE-OF-THE-ART TECHNOLOGIES



IZOLYATOR

Founded in 1896

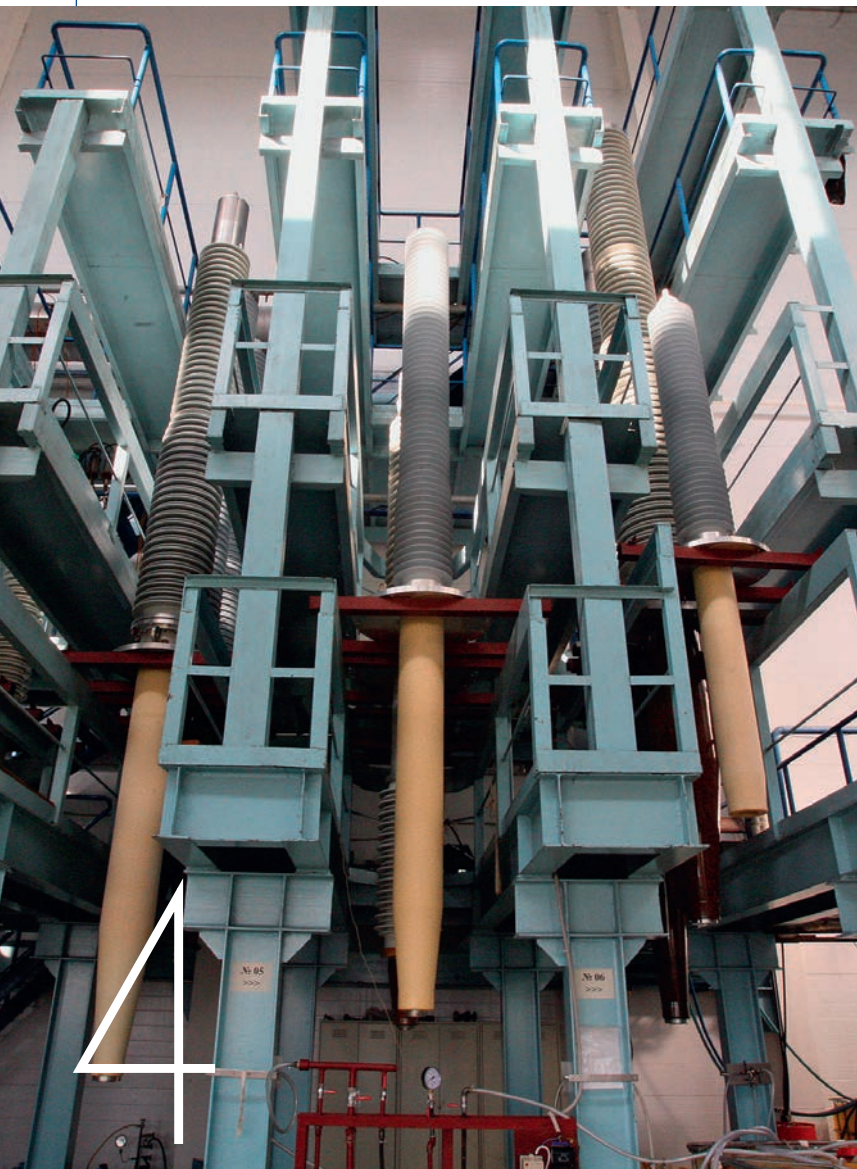
#1/2019 (20) January - March, 2019

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To be a step ahead, keeping traditions true



**Dr. Alexander Slavinsky,
Chief Executive Officer
of Izolyator Plant, Head
of CIGRE National Study
Committee D1**

Since 2018, the power industry of Russia has followed a course towards redirecting the key technological processes to a new digital platform. Supporting the concept of digitalization, our company began designing a new lineup of bushings with possibility of connecting power to additional diagnostic equipment besides standard functions. These options will be highly demanded in the near future for re-equipping old-type power transformers and switches that have no preinstalled diagnostic tools.

Designing and erection of new digital substations required application of new types of high-voltage equipment, including our high-voltage bushings. From the perspective of objectives that the digital substations face, the bushings with the new solid RIN insulation seem to be the most suitable.

RIN (Resin Impregnated Nonwoven) is a nonwoven synthetic material, saturated with resin. This in every meaning innovative component allows to create new generation high-voltage bushings. So, excluding paper from the solid insulation of a bushing, one can dramatically improve moisture resistance, allowing to simplify requirements to storage conditions of bushings.

The material has great hydrophobic features, making the dielectric loss factor absolutely stable and free of extremely high humidity effects and ensures ease of transportation, absence of specific requirements for storage as well as reliability of operation.

Digital substations are designed to keep equipment maintenance minimal, so if a technical problem occurs the faulty equipment should be easily replaced as a blown fuse.

So the bushing with with solid internal RIN and polymer external insulation meets serves the purpose. Should such

a bushing be damaged, the equipment that it runs on and the bushings of the other phases stay intact. So, in such cases one has to simply replace the bushing and keep supplying power to consumers.

RIN bushings are certified to GOST RF state certification system requirements. We have obtained corresponding certificates from the Federal Agency on Technical Regulation and Metrology. Presently, we are on final stages of certification procedure of RIN bushings by ROSSETI PJSC.

It is worth saying that the RIN insulation has a high heat conductivity and low temperature coefficient of thermal expansion, making possible to have decreased stress between the elements of a bushing, meeting in a mechanical joint. It is crucial for operating at extreme temperatures, both low and high. In turn, these properties of RIN insulation show prospects of creating equipment, using the superconductivity effect.

Bushings should be able to reliably operate on such equipment at extremely low temperatures. At the same time, the bottom part of the bushing may operate in the liquid nitrogen at - 196 degrees centigrade, while the top part - at the ambient temperature.

Our research has shown that the RIN insulation made of synthetic nonwoven



RIN bushings on manufacturing racks at the assembly shop of Izolyator

material makes it possible to manufacture bushings that will bear all electric and mechanical loads in such extreme operating conditions. In the result, Izolyator plant has designed and made 110 and 220 kV bushings, which passed all acceptance tests. Presently, Izolyator is a sold high-voltage bushings manufacturer in the world that successfully completed acceptance tests of 110 and 220 kV bushings with bottom part immersed in liquid nitrogen at - 196 C.

These high-voltage bushings proved highly reliable and in a SuperOx project to create a three-phase HTSC-CLD 220 kV, which was installed on S/S Mnevnik in 2018 in Moscow. Based on the results of that work, the company plans to initiate a technical standard on cryogenic equipment application in power industry.

Export orders set new objectives for our company: change of design, research of technical solutions, unconventional



Production facility of Izolyator



Study of results of cryogenic tests of a RIN bushings at Izolyator

approach to execution of units. Great many of engineered solutions come into being thanks to orders from abroad.

Meeting the world's technological challenges and requests of foreign clients, we designed and put in serial production a line of DC bushings for long-distance transmission. Today, we have a complete package of documentation for making high-voltage DC bushings and additional equipment installed at the test center of the plant.

So, should they begin to build long-distance power lines on direct current - there are high-quality domestic bushings already in place for them.

The international cooperation has always been an important and large part of our company development. We greatly value an opportunity to prove reliability

and efficiency of designed technologies, materials, equipment by one of the most difficult trials - a test of time. Following this philosophy, Izolyator sets foothold in the new regions of its presence in the world, establishing exactly the same sort of partnerships - long-term, efficient.

Creation of a JV with the Indian company Mehru became a milestone in the development of international cooperation of our company and the entire domestic electrical engineering. The internal RIP insulation of our plant's design is selected to be the JV's know-how. Moreover, it is the first case for Russian companies to set up a joint venture to manufacture high-voltage equipment with Indian companies.

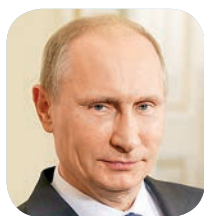
Thanks to the expansion of our international activities, we have an

opportunity to produce goods that are competitive not only on European and Indian markets, but also on the markets of South-East Asia, including China, and other regions of the world. In the near future, we see good prospects opening in the Middle East: we made our first steps in cooperation with Turkey, launching activities in Syria and develop relations with an old partner in Iran - Irantransform.

It has become a good tradition with Izolyator to please our consumers by offering new materials and technologies every year. One of our key objectives was to diversify production from a mono-product. The first step in that direction has been made: we completed a difficult preparatory stage, so we intend to launch production of cable glands already this year. ■



JV Massa Izolyator Mehru Pvt. Ltd stand at the 6 International Exhibition and Conference Gridtech 2019 in New-Delhi, India



«The groundwork that we laid by building new capacities provides for an opportunity of developing a large-scale, long-term modernization program in the power industry of Russia»

Vladimir Putin,
President of the Russian Federation

Strategically Important Power Facility of Krasnodar Kray



President of the Russian Federation Vladimir Putin at the opening of S/S Port 220 kV

President of the Russian Federation Vladimir Putin opened the 220 kV S/S Port in the video conference mode. The facility is strategically important for the Krasnodar kray in terms of development of its investment potential.

Pavel Livinsky, Director General of Rosseti pressed the start button on command of the head of the state.

The substation will provide for the railroad operation of the Crimean bridge, will feed the dry-cargo part of the sea port as well as the roadway network, M25 highway in particular. S/S Port is also to provide capacity for the newly erected industrial facilities.

«S/S Port, being a key energy facility, erected during creation of the newest electric grid, will provide 432 MVA of free transformer capacity. The facility is a part of the digital electric complex of Russia, which is now being built by Rosseti group», said the Director General of the company Pavel Livinsky.

Port substation has no analogues throughout the south of Russia in terms of its technical features. ■

Digitalization - Priority of the Russian Investment Forum

Head of FGC UES delegation Chairman of the Board Andrey Murov worked at the discussion grounds at RIF 2019 in Sochi, dedicated to the power industry development, modernization of the power sector and digitalization.

The company head visited the plenary sitting «Success factors: ideas, personnel, competences» and participated at the meeting of RF Prime Minister Dmitry Medvedev with representatives of the business.

The digital transformation of the electrical energy sector of Russia was a key topic of the agenda that FGC UES brought to RIF-2019. A.Murov participated in the round-table with heads of the subjects of the federation, moderated by the Minister of Energy of Russia Alexander Novak. The experts discussed issues of the sector development in the times of global technological advances, influence of digitalization on the economies of the regions, increasing living standards and business development.

FGC UES plans to invest in digitalization no less than 10 bln ruble annually until 2025. The priority areas are creation of no-maintenance remotely controlled facilities with a high degree of reliability, infrastructure development, including digital telecommunication networks,

implementation of new services and improving inclusive technologies (drones, data analysis, geolocation technologies, GIS, etc.). Over 30 digital substations are set for construction and over 100 facilities of the unified national energy network are to be upgraded for teleguidance. ■



Chairman of the Board of FGC UES Andrey Murov on the sidelines of Russian Investment Forum 2019 in Sochi

Effects of «Digital transformation 2030» for Rosseti:

15% decreased CAPEX

30% decreased OPEX

50% decreased losses

Rosseti presented new projects in Hannover



Rosseti delegation visiting the exposition of Hannover Messe, Germany

Rosseti presented the concept of digital transformation of power grids at one of the largest in the world exhibitions in hi-tech, innovations

and industrial automation Hannover Messe in Hannover, Germany. At Rosseti's stand they exhibited the key areas of development of the

power sector of Russia, with an emphasis on demands in equipment and software, needed for the realization of the digital transformation of power grids concept till 2030.

Rosseti group of companies is already now developing several pilots, attracting international partners under the digital transformation initiative.

«Russia is entering a new level of power sector development. To reach the ambitious target, advanced technologies and reliable equipment are required. Rosseti are open to cooperation with international partners. At the exhibition stand of Rosseti at Hannover Messe, we presented a comprehensive list of demanded equipment and software that we have planned till 2030. There are more than 200 positions in the list. We require at least 22 mln metering devices only. There is a prerequisite demanding that a localized production has to be in place on the territory of Russia», said Rosseti's Director General Pavel Livinsky.

The Rosseti delegation had meetings with management representatives of the world's leading OEMs from different countries to share experience in digital networks development. ■

2 All-Russian Cable Congress

Izolator participated at the Second All-Russian Cable Congress, which took place at the Cabex 2019 Exhibition in Moscow.

The organizers of the event were the International Exhibition company MVK, the All-Russian Research Institute of cable industry and Electro-cable Association.

180 Russian and foreign companies were represented at the Cabex 2019 exhibition - leading industry manufacturers of cable and wire products, cable distributors and suppliers, installation and design organizations and institutes, as well as consumers of cabling products. In total, this year the exhibition was visited by more than 4,000 guests.

The Second All-Russian Cable Congress at the Cabex 2019 exhibition is the main domestic business event in the cable industry for specialists of the fuel The Second All-Russian Cable Congress at the Cabex 2019 exhibition is the main domestic business event in the cable industry for specialists of the fuel and energy complex, transportation, engineering, utilities, the military-industrial complex, construction



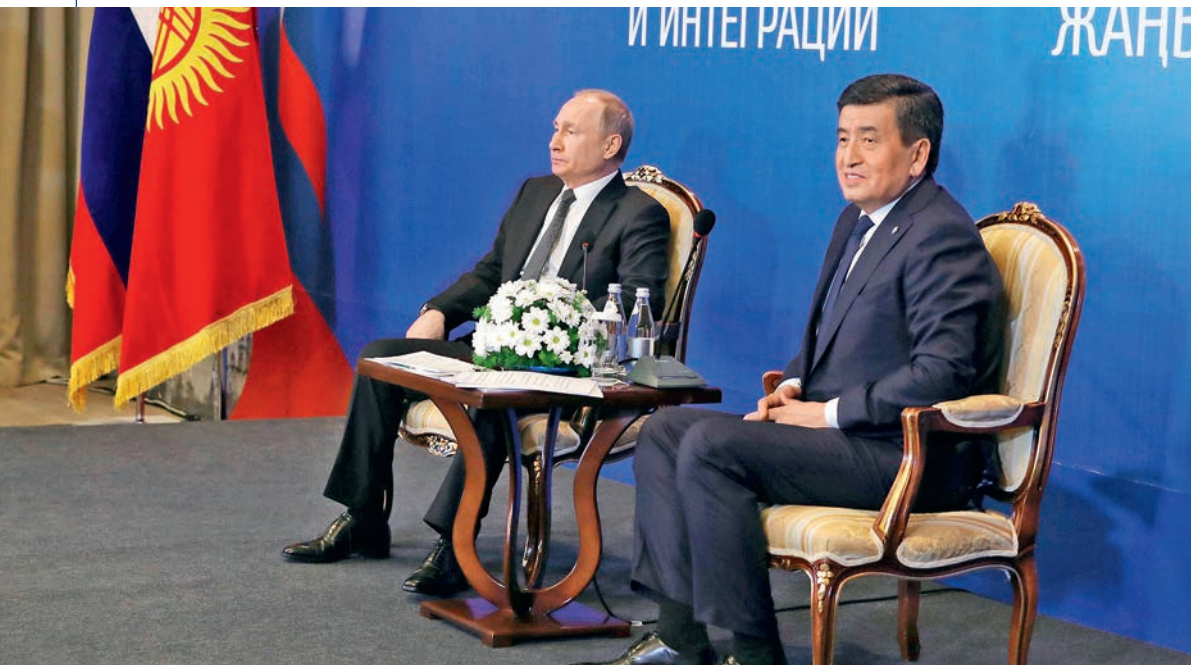
Alexander Slavinsky (center in the foreground) at the Second All-Russian Cable Congress at the Cabex 2019 exhibition in Moscow

and installation organizations, communications and telecommunications and other industries.

The discussion was attended by representatives of ministries and specialized agencies, industry associations, the largest Russian producers and consumers of cable products. Izolator was represented at the forum by Alexander Slavinsky.

The conference agenda of the second and third days of the congress was devoted to the scientific and technical issues of the cable industry, new technological approaches and trends in the production of cable and wire, problems of safety and the high level of responsibility of cable manufacturers. ■

8 | Industry events in pictures



◀ The Presidents of the Russian Federation and the Kyrgyz Republic took part in the VIII Russian-Kyrgyz Interregional Conference "New Horizons for Strategic Partnership and Integration", where they discussed issues of cooperation in energy industry

▶ Pavel Livinsky, Rosseti PJSC CHAIRMAN OF THE MANAGEMENT BOARD, Director General officially opens the Port digital substation in the Krasnodar Region



◀ Chairman of the Board of PJSC FGC UES, Andrei Murov, spoke at an extended meeting of the bureau of the Russian Engineering Union and the Association for Assistance to Defense Enterprises



◀ A meeting of the Presidium of the Scientific and Technical Council of Rosseti PJSC was held in Moscow at which the past year's R&D activities and results were reviewed, as well as plans and proposals for the strategic development of the company were presented.

▶ Assistant to First Deputy Chairman of the State Duma Committee on Energy Igor Ananskikh, Secretary of the Import Substitution Section in the Fuel and Energy Complex, member of the expert council of the International Centre for Industrial Enterprises Support and Development (ICES) Marina Mironova and Alexander Slavinsky at the insulation making shop at Izolyator



◀ Izolyator took part in the III Annual Procurement Forum of the Moscow United Electric Grid Company for its suppliers and contractors



Digital transformation: on the way to the future

On 21 December 2018, the «Digital transformation 2030» concept was approved at the sitting of the Council of Directors at Rosseti with Minister of Energy RF Alexander Novak presiding. The concept sees a complete transformation of the electric power infrastructure till 2030 by implementation of digital technologies. We are talking with the Deputy General Director, Chief Engineer of Rosseti Andrey Mayorov about the key issues of concept realization.

— **Andrey Vladimirovich, what are the goals and objectives, set by Rosseti for shaping and realization of the «Digital transformation 2030» concept?**

— «Digital transformation 2030» concept was developed in line with the decrees of the President of the Russian Federation V.V. Putin dated 9 May 2017: No.203 «On the strategy of information society development of the Russian Federation in 2017-2030» and No.204 «On the national objectives and strategic goals of development of the Russian Federation till 2024», dated 7 May 2018, where the national goals and strategic objectives of the Russian Federation development were defined for the period till 2030, as well as RF Government order No.1632r dated 28 July 2017, which approves «Digital economy of Russian Federation» program.

According to the concept, the main goal of the digital transformation is reconfiguration of the logic of processes and transition of the company to the risk-oriented management on the basis of digital technologies and big data analysis. These are the objectives for the digital transformation in the power sector:

1. Ensuring readiness of the power sector to new technological challenges and consumer demands.

2. Improvement of characteristics of reliability and efficiency of power supply to consumers.

3. Increasing accessibility of electric power infrastructure.

4. Adaptivity of the power sector to new tasks and challenges.

5. Implementation of the decision making aid system on all levels of company management, using business analytics.

6. Diversification of company business by offering additional services.

7. Development of personnel potential and new competences.

Thus, our target model «Digital transformation 2030» is a transformation of logic of company management processes (corporate and technological), based on business analytics and using big data. In terms of numbers, we aim at decreasing grid connection lead time for new consumers from existing 192 days to 120 days, general simplification and cutting costs of the procedure.

Besides, the company efficiency is to be improved. By 2030, the loss level in the power grids has to go down from 9.4% to 7.34%, e.g. for the 04.-20 kV networks from 15.6% to 8.89%. We expect to have a decrease of CAPEX by 15%, OPEX — by 30%. The power grids' reliability is set to grow almost twice: the forecasted values of such indicators as SAID and SAIFI will be brought to 2.4 and 0.92 respectively by 2030.

— **What effects from improvement of existing processes should be expected from the digitalization concept realization?**

— The expected effect will be complex and will cover many business processes of Rosseti in terms of corporate governance and technical management. The accurate end-to-end data, operating modes of the grid and its elements, obtain in real-time mode, would allow the staff members of power grid companies to ensure an adequate reaction to any malfunctions in the grid, set up predictive analytics, create models of behavior of the grid, its elements and consumers.

All that in turn will allow for form a fair cost of services, rendered by the power grid companies. The common information model of the grid will allow for bringing the technical solutions and requirements to equipment to a uniform standard, ensure data integration from various systems and consumers. New equipment and technical solutions, developed with application of modern digital technologies, will create conditions for a dramatic decrease of terms of construction, reconstruction of power infrastructure facilities, open up opportunities for a strong growth of Russia's export potential on foreign markets.

The new technological solutions will lead to changes and perfection of grid management processes. There will be a transition from a three-level to one-level system of power grid control, optimization of the operational control. With creation of a truly intellectual electricity metering system, there will be a possibility to form electric power and capacity balance-sheets, using the collected data, and to quickly decide on measures to decrease losses and optimize modes of the grid, also ensuring its development in an automatic way. The adaptive grid, created according to the concept, would ensure an active engagement of the power market players and subjects in the electricity transmission and distribution processes, intellectual control over the grid operation modes without participation of man.

— **Russian Federation and Rosseti are not pioneers in the field. In many countries of the world, energy companies are developing similar projects. Will you use the outside experience in the concept realization?**

— Indeed, it is a worldwide trend to transfer all key technological processes in the power sector to digital technologies and many power companies in the world have received good results. The domestic power sector is yet at the very beginning of digitalization. However, the starting conditions should provide an additional motivation to mobilize effort and resources of the company, aiming not only to retain its leading positions in the global power industry, but to ensure a stable development of the country and support its key role on the global arena. Naturally, all available best practice will be used. There is no time for further delay because of the fact that more than 70 % of equipment of the electric grids in Russia has reached the end of its service life, defined by the manufacturer. In Rosseti subsidiaries, one can still find facilities and equipment, put in operation in the 30ies of the past century. By 2030, the digital transformation concept's timeline, some of them will be celebrating a centenary.

— **That means that the concept's realization is also a grand renovation program of the obsolete equipment?**

— By all means, the old and worn equipment at our power facilities will need to be replaced. The concept sees the following activities to replace worn-out equipment:

1. Replacement of electromagnetic measuring transformers by optical or installation of analogue-digital converters on existing current and voltage transformers to form a digital signal.
2. Replacement of electromechanical relay protection by microprocessor type. It will ensure full selectability, disconnection of only damaged segment of the network.
3. Organization of communication channels (installation of commutators, routers). Information will be transmitted directly to the dispatch board.

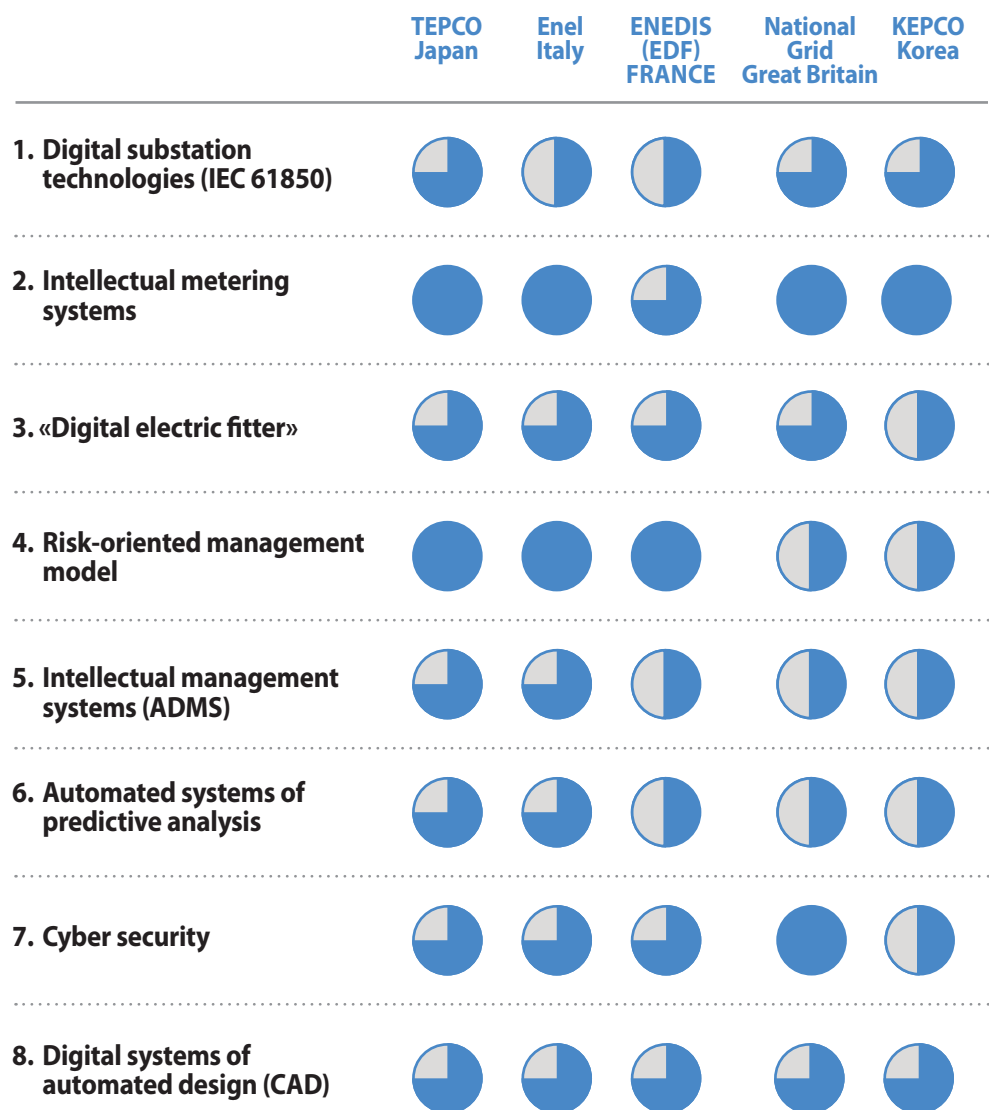
4. Replacement or installation of teleautomatics controllers, allowing for controlling the grid parameters.

5. Installation of intellectual devices on all substation connections (technical record-keeping). The system would ensure control of voltage levels, possibility to control commutation devices.

6. If necessary — to replace primary equipment of substations (transformers, reactors, switches, circuit breakers).

— **Thank you very much for the interview. We wish Rosseti success and great achievements in realization of the concept of digital transformation of the power sector.**

By Ekaterina Guseva
For complete interview please refer to **ELECTRIC ENERGY**.
Transmission and Distribution Magazine



World's best practice in digital transformation of power sector as of the end of 2018



Combining opinions



Meeting of the Russian Study Committee D1 RNC CIGRE at Izolyator

At the end of February, Izolyator held a meeting of the National Study Committee D1 Materials and Emerging Test Techniques of the Russian National Committee of CIGRE. The chairman of the

meeting is Alexander Slavinsky, Eng.D., Head of the Russian Study Committee D1 RNC CIGRE, the representative of Russia in the Study Committee D1 CIGRE, General Director of Izolyator Plant. The meeting

was held in the form of a videoconference, which allows us to promptly discuss current issues and make decisions together with all members of the committee from different cities of Russia.

Among the issues discussed at the meeting were the following:

- the work plan of SC D1 RNC CIGRE for 2019,
- preparation for the 48th CIGRE Session,
- preparation for the RNC CIGRE Reporting Conference following the 47th CIGRE Session,
- information on the participation of SC D1 RNC CIGRE representatives in the open work groups of the CIGRE SC D1 Research Committee,
- proposals for the interaction of SC D1 RNC CIGRE with young professionals, undergraduate and graduate students,
- evaluation of performance results of members of the SC D1 RNC CIGRE in 2018,
- preparation for the colloquium to be held in Moscow in 2023 in cooperation with the A1, A3 and B3 national study committees of the RNC CIGRE.

In his closing speech, Alexander Slavinsky thanked those present for the fruitful work and expressed confidence that due to the joint efforts the work of SC D1 RNC CIGRE will be brought to a whole new level, and the results will have a major impact on the activities of the CIGRE SC D1. ■



L-R: Project Manager - Maxim Bobryshev, Engineer of technological materials supply department of ElektTrade-M LLC, and Timofey Shadrikov, Ph.D., Associate Professor of Department of high voltage power engineering, electrical engineering and electrophysics at Ivanovo State Power University at the meeting of the National Study Committee D1 RNC CIGRE at Izolyator.

CIGRE
members
are more

than **10000** organizations and over **70000** experts



Conference Hall of the Sixteenth Annual Conference, organized by Dimrus in Perm (photo: Dimrus)

Sixteenth Annual Conference of Dimrus Company

This February Izolyator representatives took part in the Sixteenth Annual Conference «Methods and Means of Monitoring the Insulation of High-Voltage Equipment» organized by Dimrus company in Perm.

Main topic of this year's conference is «Methods and means of monitoring, diagnostics of defects, testing of high-voltage cable lines».

The conference was attended by over 250 Russian and foreign specialists from the cities of Perm, Yekaterinburg, Cheboksary, Novosibirsk, Kemerovo, Moscow, St. Petersburg, Kazan, Milan (Italy), Ludvika (Sweden).

The conference participants made 28 reports on various issues relating to methods and means of monitoring, defect diagnosis, testing of high-voltage cable lines.

Representatives of the Russian Study Committee D1 Materials and Emerging Test Techniques of the Russian National Committee of CIGRE (RNC CIGRE) took an active part in the conference.

Izolyator was represented by Alexander Slavinsky, Eng.D., Chairman of the Board of Directors at Izolyator, Head of CIGRE Russian Study Committee D1, and Deputy Quality Director at Izolyator, Coordinator of CIGRE Russian Study Committee D1 Vladimir Ustinov, who made a presentation on The Main Directions of Monitoring, Diagnostics and Testing of Electrical Equipment on the basis of the 47th CIGRE Session

Also, the Russian Study Committee D1 RNC CIGRE was represented by the following participants and reports:

- - Valery Rusov, Ph.D., chief engineer at Dimrus with presentation on Diagnostics and monitoring of cable lines using the methods of control of partial discharges and presentation on Dimrus New Technologies of high-voltage equipment testing,
- - Irina Davidenko, Doctor of Engineering, Professor of the Ural Federal University (UrFU) with presentation on Order of power transformers maintenance and repair operations with consideration of their technical condition and assessment of risk of failure.

The conference hosted a working meeting of the Public Council of Specialists in Diagnostics of Power Electrical Equipment at the Engineering and Technical Center (ETC) UralEnergEngineering, in which A. Slavinsky and V. Ustinov also participated.

During the meeting participants made presentations on the work of the council and took a decision on the topic and venue of the plenary meeting set to take place in 2019.

We appreciate Dimrus for invitation and warm hospitality as well as top-level conference organization! ■

Public Council for the diagnostics of electrical power at the Engineering and Technical Center UralEnergEngineering, Izolyator plant, Public Council of specialists of Siberia and Far East on electrical installations diagnostics and the National Study Committee D1 RNC CIGRE invite you to take part in the scientific conference

“Production, operation, diagnosis and repair of high-voltage bushings and measuring transformers. Requirements to transformer oil for high-voltage electrical equipment»,

which will be held on September 10-12, 2019 in the Riga Land business center (Moscow region, Krasnogorsk district, 26th km of the “Baltic” highway)

To find out participation requirements please email to Vladimirova Marina, Secretary of the Council at ETC UEI Vladimirova-MN@te.ru and to the Council address sovetdiag@yandex.ru

Cable fittings — a new business line at Izolyator

Konstantin Sipilkin,
R&D Director

Just a few months ago in August 2018, A.Z.Slavinsky discussed issues of strategic development and diversification of existing product range during CIGRE exhibition. Participation in import substitution programs and setting up of innovative production sites were also discussed in connection with the above. In the result of the meeting and feasibility study and market study, we took a decision to launch production and sales of high-voltage cable fittings in 110 - 500 kV range.

Our feasibility study, which included a detailed overview of various sides of the project, took several months and was done with support of invited specialists in close cooperation with Izolyator's divisions. After a careful study of the overview results and risk analysis by Izolyator group management, the company decided: «we kick off the project!» So, already on 1 April 2019, the national registry made a new entry about a new company Izolyator-AKS LLC established for the purposes of organization of production and sales of high-voltage and ultra-high-voltage cable fittings. Creation of a new company and expansion of product range within the same group of companies will not only help to strengthen presence on the power markets of Russia, CIS and rest of the world, but also to considerably expand it. Moreover, we expect that with a correct approach to starting the new business and developing that project we will have synergy effects giving additional competitive edge to the whole group and providing impulse for further sustainable development.

Presently, Izolyator-AKS LLC is almost fully staffed with specialist having years of experience with the product, including track record of setting up production of cable fittings. We were able to create a dream team of professional, capable of delivering targets in short time with respective support from the group. So far there is one issue left to be finalized: how we organize the design office.

The new company faces global and, one may say, ambitious targets: to set up production of cable fittings and start sales to the leading Russian customers in the shortest time. Importantly, up until recently we had foreign manufacturers dominating on the market of high-voltage cable fittings. Only beginning from 2011, some Russian cable plants and installation companies attempted to organize production of such accessories. However, in view of absence of qualified personnel with experience in production of high-voltage cable acces-



Domestic power sector in general and the market of cable fittings in particular are in desperate demand of quality cable accessories.

sories, know-how and understanding of technology subtleties (lack of investment or failure to use it efficiently - to complete the list), only one attempt ended in success. Just one company in Russia was capable to set up a local production of 110 - 220 kV cable accessories to this moment. While the product range from 330 kV and higher is still imported by Russian energy companies from foreign suppliers.

The need of creation of a highly technological production of fittings in Russia, able to compete on the global market, was among the long-standing ones. The situation of the recent years, with grave dependence on imports, lack of modern technologies and manufacturing equipment, suited neither government structures, nor private customers. Es-

establishment of Izolyator-AKS LLC is an optimal response to the challenges of the time. It fully meets the objectives of the presidential import substitution initiative and localization requirements of the Ministry of Energy of Russian Federation and the Ministry of Industry and Trade as well as demands of the fuel and energy sector companies that consistently work to decrease dependence on imported equipment and supplies and implement domestic technologies and materials of the world-class quality.

To kick off the project and, naturally, satisfy the market demands, Izolyator-AKS LLC must develop and begin production of cable accessories of all voltage classes from 110 to 500 kV offering a complete range: connecting and end sleeves, plug connectors.

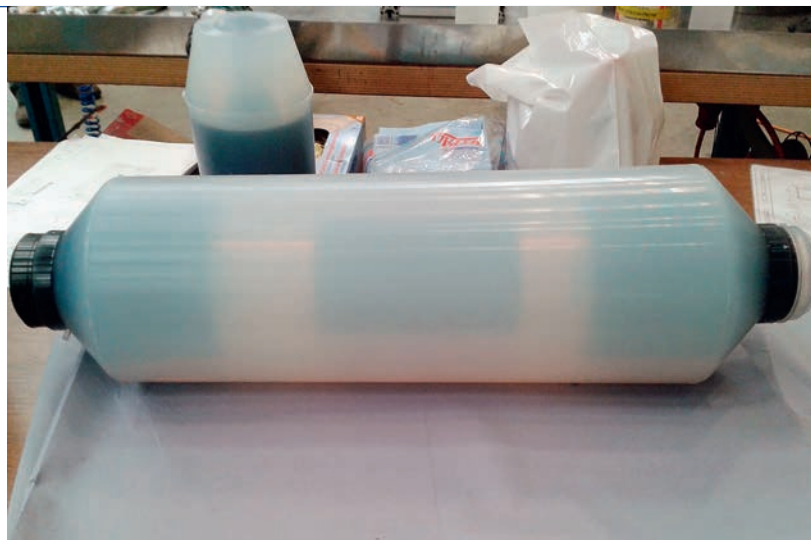
The management of the new company pays a special attention to analyzing the existing information on production and experience of other manufacturers and evaluating key success factors for the start-up and development, namely:

- purchase and commissioning of modern and meeting requirements of the day production and testing equipment from leading global OEMs;
- ensuring a high level of localization by maximizing capacities of own manufacturing site inside the group and procuring parts from domestic suppliers that offer suitable quality;
- ensuring sufficient stock in place for getting short-term deliveries;
- high level of quality and reliability of products;
- meeting inquiries and demands of key customers with proper production and sales profitability ensured;
- organization and implementation of lean management in the organization, eliminating excessive time, administrative resources, paperwork and red tape with ongoing optimization of control system over production costs and expenses.

With a successful realization of the above factors and achievement of a balanced and optimized coordination both inside the group and the market, the company will be able to offer a strong competition to the existing manufacturers and with time occupy a leading position on the local market of cable fittings.

I should say that the newly established company is not a third party manufacturer, but part and parcel of Izolyator group of companies. The success of the new company depends on us: management team and staff members. In the process of practical cooperation, knowledge and experience sharing, non-bureaucratic and timely support of the young business, especially at the start-up stage, we should provide for substantial and timely assistance, decreasing risks of negative development by doing so.

Judging from the current market situation analysis and taking into account the implementation of success factors by the management of the new company, we can safely conclude that the production of high-voltage cable accessories is an attractive and profitable business for the whole group. By all means, realization of the investment project - just as any other - will require considerable financial placements and will be associated with several risks that we intend to track and factor in for decision making. Yet, it is expected that in the mid-term and long-term range, Izolyator-AKS LLC will become a source of income in the group's interest, enabling it not



Silicone control trunk of a connecting sleeve

only to strengthen but to expand the influence and presence of Izolyator group on the power market of Russia.



End sleeve fitting at the test laboratory

In 2018 **32** new bushing designs were developed, including **750** kV voltage class units

Introducing the latest technology



Management of Sevcable Group of Companies and Sevcable Scientific Research Institute in the Izolyator plant assembly shop

In March Izolyator was visited by the management of the industrial Group of Companies Sevcable and its subsidiary Research Institute.

Sevcable was represented by CEO Sergey Yarmilko and Director of Legal Affairs Maxim Ischenko, Sevcable research institute - by Director Pavel Tsvetkov and Chief Designer Georgy Greshnyakov. Izolyator party was represented by Alexander Slavinsky, General Director and R&D Director Konstantin Sipilkin.

During the meeting technical and organizational opportunities of joint development of high-voltage cable fittings were discussed.

The parties shared successful experience in designing modern electrical equipment, outlined a plan for further actions and determined the order of interaction in the preparation and implementation of a joint project.

During a tour of the plant production facility, the guests were presented modern technologies of production of high-voltage bushings with solid internal RIP and RIN insulation. Head of the test center, Dmitry Ivanov, presented the equipment and introduced the guests to the process of testing finished products.

In the corporate museum, visitors were introduced to the century-old history and today's achievements of Izolyator. The guests also visited own sports hall of Izolyator. ■

Joint project discussion

Mikhail Astashev, PhD Lead Engineer of Industrial Electronics department of the Moscow Power Engineering Institute paid a visit to Izolyator to discuss progress of a joint project with our company.

In 2017, MPEI and Izolyator signed an agreement to engage in joint applied research in Development and experimental research of technical solutions to create autonomous semiconductor control devices of series compensation for the purposes of increased reliability of aerial power lines.

Izolyator team members R&D Director Konstantin Sipilkin, Chief Designer Yury Nikitin, Chief Accountant Elena Posokh, Head of SVN-Service Dmitry Mashinistov took part in the discussion of the interim results and prospects of the joint project.

The parties summarized their activities in 2018, outlined work schedule and agreed on further steps to have an efficient interaction under the program. ■



Discussion of joint project at Izolyator, L-R: Dmitry Mashinistov, Yury Nikitin, Konstantin Sipilkin, Elena Posokh and Lead Engineer of MPEI's Industrial Electronics Dpt Mikhail Astashev, PhD



Functional tests of the Canadian Positron equipment in the Izolyator test center

Tested in special conditions

Functional tests of the Canadian company Positron Inc. tester were carried out in March. Tester purpose is the diagnosis of insulators under voltage. The tests were part of a set of measures for the certification of Positron test-

ers for compliance with the technical requirements of Rosseti PJSC.

Development engineer of Positron Inc., representatives of the company «Electrical solutions» - the official dealer of Positron Inc.

in Russia, certification committee of ROSSETI PJSC participated in testing procedure.

The certification committee of ROSSETI PJSC included representatives of the Equipment Test Department of the Federal Testing Center, the Ural Interregional Distribution Grid Company, the Diagnostics Department of the Backbone Electrical Networks Center and the Scientific and Technical Center Electroengineering, Diagnostics and Service.

Testing was preceded by a presentation of Izolyator products with a description of the construction design of high-voltage bushings, which was carried out by Vladimir Ustinov, Deputy Quality Director.

Based on the special conditions of the test, right before the start a briefing on safety was held, which was conducted by the Assistant General Director for Safety Boris Sobelman.

Aiming to determine the functionality of Positron tester, Izolyator provided 110kV transformer bushings with solid internal insulation.

Dmitry Ivanov, Head of the Izolyator Test Center, led the tests.

At the end of the tests, there was a broad discussion of all measurements data and their interpretation.

Testing of the Positron tester at Izolyator plant was carried out in full compliance with the procedure for certification of equipment, materials and systems adopted by ROSSETI PJSC. ■

Continuous quality control

A meeting on quality issues where Izolyator summarized results in quality management and interaction with operating companies was held at the company in February. This annual meeting serves as a starting point for organizing a systematic, targeted and regular work of Izolyator on product quality improvement and interaction with operators of equipment.

Quality Director Alexander Novikov in his report informed the colleagues about the progress of quality assurance program in 2018 and spoke about the results over the reporting period.

Among the most important news of the year was the purchase and commissioning of equipment that enhances capabilities of Izolyator plant's test center: 1200 kV pulsed voltage generator and spray test unit for electrical equipment.

In 2018, Izolyator received a compliance certificate from Rosenergoatom Concern. The company received a successful recertification audit of quality management system for conformity to the international standard ISO 9001:2015, certification audit of the system of ecological management for conformity to ISO 14001:2015, audit of labor safety and protection for conformity to OHSAS 18001:2007.



Alexander Novikov is telling about the progress of quality assurance program in 2018

The largest part of that report was dedicated to quality indicators analysis.

The Head of SVN-Service Dmitry Mashinistov made a presentation about the results of interaction with equipment operators in 2018. Over the reporting period, the team commis-

sioned 75 high-voltage bushings including the first in Belarus 750 kV RIP bushings installation.

In conclusion of their speeches, the reporters presented their work plans in quality management and interaction with operating companies in 2019. ■

18 | Development of transmission of direct current in power industry

In recent years, many power systems, especially in countries with large territories, are using the technology of electric energy transmission on direct current to cope with a whole number of tasks. Among those tasks there are integration of small and renewable generation to the power grid (CSP, WPP, etc.), power supply of remote territories, negotiation of a water obstacle, identifying levels of short-circuit current, uniting energy systems with differing levels of frequency regulation, etc.



Converter substation of direct current transmission Estlink 2 (Estonia - Finland). Capacity 650 MW

In the past years, the number of transmission projects and direct current links (DC links) in the world power industry has grown considerably. In approximately five decades since early 50ies until the end of the 90ies, about 100 direct current facilities with voltage above 50 kV were put in operation throughout the world. In the decade 2000 - 2010, - about 40, and, beginning from 2010 with an outlook till 2020, there are more than 80 DC facilities planned and well under construction.

If in the XX century almost all erected lines were executed on alternating current, in the time span of 2010 - 2030, 22 -25% of the general transmission capacity

of operating, being under construction and planned for construction power lines in Europe will be on direct current.

The total transmission capacity of DC projects and DC links, put in operation over the last 40 years, has reached 100 GW in the world. In the next decade, another 250 GW of total capacity on DC projects and link is to be commissioned. The global market of direct current facilities doubled over the past five years, amounting to 6 bln EUR per year, which is twice as higher than the level of 2010.

The trend of active application of direct current facilities in the global power industry is explained by a number of their

technological, intellectual and ecological advantages.

Direct current transmission has less, compared to aerial transmission line (ETL) on alternating current, costs on transmission of one kW/hr of electric energy in equal conditions of reliability in case of exceedance of some certain length of the line. This characteristic is clearly expressed through relation of costs to the length of the bipolar direct current main and double-circuit line on alternating current. The critical value of the power line length, when the required investment in AC ETL becomes the same as that of DC projects, equals 400 - 700 km.

The cable transmission of direct current also has less, compared to the cable lines of alternating current, costs on 1 kW/hr transmission in equal conditions in case of exceedance of some length of the line. The gain in the cost of a DC cable line is achieved mainly through absence of necessity in compensating installations, especially on large lengths. For a cable transmission on direct current, the losses will make approximately 0.3 - 0.4% for 100 km of the cable, for a cable line on alternating current - 8 - 10% for 100 km of cable.

Estimates of value show that the cable line on direct current becomes cheaper than its complete counterpart on alternating current at the lengths exceeding 30-50 km. In case of electricity transmission through wide water obstacles (more than 50 km), there is virtually no other from the economic point of view alternative than using a direct current line with underwater cable.

Unfortunately, the domestic power industry has lost all positions that it used to have in the field. All example of serious success date back to the past: the first in the world power line put in test operation Kashira - Moscow, the largest in their respective time Volgograd - Donbass project and DC link in the Russia - Finland route. Up until mid 80ies of the last century, the USSR held leading positions in DC transmission technologies.



Rectifying equipment shop for direct current transmission between France and Spain. 1000 MW capacity on IGBT

Presently, there are only two facilities operating: DC link Russia - Finland and DC link at 220 kV S/S Mogocha in the unified energy system of Siberia.

Currently, power grid companies normally avoid using power transmission on direct current, referring to these main disadvantages of that technology:

- need to transmit large volumes of energy to ensure economic effect;
- inability of connecting intermediate consumers of electric power to the DC line;
- lack of experience with such projects on the territory of Russia;
- absence of domestic manufacturers of equipment for DC lines.

Despite the fact that almost all technical disadvantages of DC technology have already been eliminated, the Unified energy system of Russia keeps running on technically and economically ineffective solutions, using the traditional power transmission technology on alternating current, which is derived from the absence of experience in erection and operation of direct current facilities. In its turn, it leads to a complete loss of skills, needed for designing and creation of equipment for direct current facilities.

Application of DC projects could be effective for solving such tasks as connection to energy systems of generators with unstable generation level, depending on ambient conditions of environment (wind farms, solar power plants, tidal electrical stations, etc.), power supply of insular and peninsular territories, remote autonomous loads and offshore platforms, connection of isolated energy systems to the unified energy system of Russia.

To implement direct current transmission technology in the UES of Russia, development of a strategy of development is needed on the state level, which should include activities, directed to realization of pilot projects of such power transmission technology.

Our country possesses sufficient research and technical infrastructure for performing such reformation. For instance, the staff of the Research Institute of electric power transmission on high-voltage direct current (NIIPT, since 2012 - Science and Technology Center of UES JSC) has a large experience in application of DCT technology in power systems, such as development of feasibility studies of direct current application, design of technical solutions for their integration

in the power system and to ensure a reliable and uninterrupted operation. STC UES JSC specialists actively engaged in feasibility studies of power transmission project on direct current over the last 15-20 years, accumulating relevant experience.

Thus, STC UES is virtually the sole large scientific center to have retained competences in feasibility study of power transmission projects on direct current in all the details and subtleties of that technology and systemic effects. STC UES could play a key role in organization of a competence center to develop the technology of power transmission on direct current. Such a center would have to develop a strategy of DCT technology development in Russia as a primary goal, also leading pilot projects in construction of direct current power facilities.

Based on the article by V.A. Kritsky, General Director STC UES JSC and A.S. Gerasimov, PhD, Deputy General Director - Director of system studies and advanced development Department of STC UES JSC in the ELECTRIC POWER. Transmission and Distribution Magazine

**Ivan Panfilov,
Commercial Director 1st Deputy
CEO Izolyator**

Izolyator has won trust from the partners all around the world, constantly confirming the high status of the leader in the production of high-voltage bushings, including those with solid RIP and RIN insulation. At the same time, we are constantly working to strengthen partnerships with power grid and generating companies, as well as with transformer plants around the world.

One of the conditions for the development of a modern enterprise is the expansion of the market both domestically and abroad. At the moment, Izolyator supplies about 80% of its products to the markets of Russia and the CIS countries, and 20% of the products are exported overseas.

We regularly conduct a thorough analysis of the main trends of the international electric power industry market in order to find strategic partners for planning effective and long-term cooperation. An important factor in the development of international cooperation is the fact that Russia is an active participant in the CIGRE International Council on Large Energy Systems.

In 2018, our company significantly strengthened its relations with long-term and reliable partners from the CIS countries - power grid companies and energy equipment manufacturers in Armenia, Moldova, Tajikistan, Kazakhstan, Belarus, Ukraine, Uzbekistan and Georgia. Izolyator gained reliable partners in European and Asian countries and contributed to the strengthening of relations between the national energy systems of Russia, Vietnam and India. Of particular importance to us is the building of productive cooperation with Asian power grid companies and with leading manufacturers of transformer-reactor equipment in this region. We continue to supply our products to key power facilities of the state-owned Power Grid Corporation of India Limited and the Vietnamese state power grid company EVN NPT.

In 2018, we entered into a strategic agreement with the Indian company Mehru Electrical & Mechanical Engineers (P) Ltd. (India) on cooperation and collaboration in the framework of a project to create a joint venture producing high-voltage bushings with solid RIP insulation in India. At the moment, active work is underway to form and promote the brand of a new joint venture in the Indian and global power industry markets.

Our strong leadership is a places responsibility on our company. We especially emphasize that we are ready to openly share our unique accumulated experience with all our partners, considering it an integral part of our mission - to continuously create the foundations for stable and sustainable energy supply throughout the world.

In February this year, an annual report of the Izolyator company's commercial service was held, dedicated to the results of 2018 and plans for 2019-2021.



Izolyator objectives in the international arena are:

- sharing unique experience with leading global electric grid companies;
- long-term cooperation with leading global electric grid companies;
- long-term cooperation with leading global manufacturers of power equipment;
- promotion of Izolyator high-voltage bushings with RIP and RIN insulation on the international energy market
- brand and product promotion of the new Massa-Izolyator-Mehru joint venture (MIM).

The event serves as the basis for the organization of targeted and systematic work of the commercial service.

The reports were presented to the top management of the company under the leadership of Alexander Slavinsky.

All reports were based on strategic priorities and goals developed in each unit in accordance with the profile of its activities and consistent with commercial



Ivan Panfilov opens the reporting meeting of Izolyator commercial service



Izolyator top management representatives are listening to the report of the sales division

strategy of Izolyator. The speeches were accompanied by an active discussion and a large number of data presented, reflecting the great and successful work that the commercial service together with business partners had been doing throughout the past year.

The past year was marked by extremely important events both in Russia and abroad. The overwhelming majority of commercial goals were achieved, and in a number of areas, the reported figures exceeded those planned at the beginning of the year.

The achieved success further strengthened the position of the Izolyator brand as the world leader in development and production of a wide range of high-voltage bushings with solid insulation.

After summarizing the results of the accomplished work, the goals and objectives for the next three years were presented, in which the main place is occupied by the consistent development of partnerships in all areas of the enterprise's commercial activities.



Andrei Shornikov, Head of the Department for Foreign Economic Activity, reports on the results and plans of activity



Izolyator is a team of professionals, of like-minded people who are unified and committed to common values.

Dr. Ashok Singh

High-voltage bushings are an integral and very important part of a huge variety of power equipment. Without inputs there can be no large power transformers. Throughout history, they developed together with transformers and other high-voltage technology.

Improving operational efficiency and product quality is the main task for the further development of any company. In addition, high-quality products and services at highest world standards are very important for building a brand and for retaining loyal customers.

Izolyator is a team of professionals, of like-minded people who are unified and committed to common values: transparency, consistency in working with suppliers, customers, government agencies, banks, financial institutions, etc.

During these years of work in India, the company has managed to build relationships with suppliers, customers and specialists of power grid corporations and transformer plants in India, which is the most important factor in the company's further growth and expansion of its presence in the Indian market.

Focused approach as well as efficient and timely delivery of products help the Izolyator to build strong relationships with partners around the world.

Establishing strong mutually beneficial long-term relationships with strategic supplier management is a critical step towards improving the performance of the entire supply chain, obtaining greater economic efficiency, growth and business development.



Izolyator kindly invites partners to take part in the International Technical Conference dedicated to the beginning of the supply of high-voltage bushings with solid RIP-insulation of ultrahigh 420kV / 3000A and 800kV / 2000A voltage as well as to join full range of standard tests of high-voltage bushings on the basis of the Central Power Research Institute CPRI.

An event of this scale is the undoubted recognition of the quality of Izolyator products both in India and around the world. The standard test program includes a full cycle of electrical, current and special seismic tests of 420kV / 3000A and 800kV / 2000A bushings. The most interesting and unparalleled in history will be the test of 800kV / 2000A bushing for seismic resistance – final stage

completing the main test cycle during the upcoming international event.

The main part of the event includes an open technical conference providing great opportunity to discuss all aspects and technical features of operation, installation and maintenance of high-voltage bushings with RIP-insulation of ultrahigh voltage made by Izolyator.

Declaring our goodwill, transparency and readiness for dialogue, we invite consumers of high-voltage equipment to participate in this event – namely representatives of electric grid companies, manufacturers, partners from Russia, Europe, Asia and the Middle East.

Date of event:

May 21-23, 2019;

**Venue: CPRI Testing Complex,
Bengaluru, Karnataka, India**

(a BUSINESS VISA to India is required to enter the CPRI territory);

We are ready to provide INVITATION from our Indian partners for you to obtain a business visa to India!
We invite you to take part in this open international conference.

To participate in the event, please fill out the online registration form: <http://mosizolyator.ru/international-technical-conference/>

Event coordinator:

Maria Kurganova, m.kurganova@mosizolyator.ru
+7(495) 7273311 (ext. 128), +7 968 516 6699

Continuing the dialogue with Indian partners



Participants of a trilateral meeting from Transmission Corporation of Telangana Limited, Toshiba Transmission & Distribution Systems (India) Pvt. Ltd. and Izolyator plant

A series of meetings with representatives of power grid and electrical companies in India was held at the end of last year.

Business meetings and negotiations with leading state, regional power grid companies and manufacturers of electrical products in India took place.

Rajasthan Rajya Vidyut Prasaran Nigam Limited

Visit to the state regional power grid company of Rajasthan Rajya Vidyut Prasaran Nigam Limited started with acquaintance. Izolyator representative was welcomed by the employees of Transmission, Research and Development and Purchase Departments.

The presentation of Izolyator plant and its products was held with an emphasis on the technology of production of high-voltage bushings with solid internal RIP insulation. During the meeting companies discussed opportunities of mutually beneficial cooperation.

Power Grid Corporation of India Limited

Business meeting in the state power grid company Power Grid Corporation of India Limited was held with participation of Mr. Bhomwick.

During the meeting parties discussed technical and organizational aspects of standard testing of high-voltage Isolator bushings with the participation of PowerGrid specialists. The sides updated and agreed on the schedule of upcoming joint activities.



Dmitry Orekhov (to the right) during a visit to the CG T1 plant of CG Power and Industrial Solutions Limited

400 kV Bamnauli substation of Delhi Transco Limited

Visit to the Bamnauli 400 kV substation of the state regional electric grid company Delhi Transco Limited in Delhi became one of the highlights of the trip.

The three-phase autotransformers of the substation with a capacity of 500 MVA each contain Izolyator high-voltage bushings with RIP-insulation for 52, 252 and 420 kV. The substation employees confirmed the high quality of the installed Izolyator bushings and their successful operation for more than three years.

Delhi Transco Limited sent a similar confirmation at the official level to Izolyator on October 11, 2018.

Transmission Corporation of Telangana Limited и Toshiba Transmission & Distribution Systems (India) Pvt. Ltd.

Three party negotiations with the participation of representatives of the state regional power grid company of the state of Telangana Transmission Corporation of Telangana Limited and the Transformer plant Toshiba Transmission & Distribution Systems (India) Pvt. Ltd. were held in Hyderabad.

TSTRANSCO was represented by Narsing Rao and Krishna Reddy, TTDI - by Anil Kumar and Mr. Ramakrishna.

The main topic of the talks was the clarification of the procedure of participation of TSTRANSCO specialists in testing high-voltage Izolyator bushings, which will be installed on TTDI transformers designed to equip substations of TSTRANSCO.

TSTRANSCO and Izolyator already have successful experience of such cooperation.

CG T1 plant of CG Power and Industrial Solutions Limited

Visited to the CG T1 transformer plant of CG Power and Industrial Solutions Limited was also marked by fruitful negotiation of further cooperation

Guest was welcomed by Pravin Dongarwar and Mukesh Mahajan.

During the company visit, issues of practical cooperation and effective planning of joint activities were discussed.

All business trip meetings were held successfully and with a common focus on the future and long-term cooperation.

We appreciate all our Indian partners and all meeting participants for the invitation, warm hospitality and active cooperation for further strengthening of Russia-India business ties and the century-long friendship between our countries. ■

Setting stage for Izolyator bushings tests in India

◀ Visit to the Central Power Research Institute of India CPRI: a discussion of the schedule for conducting standard tests of Izolyator bushings with solid RIP-isolation for ultrahigh voltage classes 420kV / 3000A and 800kV / 2000A



▶ CPRI test center: seismic test laboratory of 420kV / 3000A and 800kV / 2000A bushings



▼ Discussion of the technical characteristics of the test equipment at the factory of Swathi Industries in Hyderabad



▲ Discussion of upcoming events: tests and open international conference with Mehru Electric Mechanical Engineers (P) Ltd. management in Delhi

▶ Participants in the preparation for testing the Isolator bushings at the Swathi Industries manufacturing plant in Hyderabad



▼ Inspection of the test tank at the Swathi Industries factory in Hyderabad





I would like to thank you and the entire Massa Ltd — Izolyator staff for high level of service, quality of the product and timely delivery of the high-voltage equipment.

Masoud Davoodi,
Managing Director Fanavaran
Pooya Sanat Vafa (PSV Co.)

During 2010–2018, Fanavaran Pooya Sanat Vafa company (PSV Co.) purchased 214 high-voltage bushings of different ratings up to 252 kV from Massa LLC — Izolyator Company, which we were selling to major Iranian transformer producer Iran Transfo Ltd. and indirectly to IGMC (Iranian Grid Management Company) and Iranian power plants management companies.

Until this moment, we have not received any complaints about the quality of manufacture and operation of the high voltage bushing from end users of the bushing or transformer producers.

I would like to thank you and the entire Massa LLC — Izolyator staff for high level of service, quality of the product and timely delivery of the high-voltage equipment.

Fanavaran Pooya Sanat Vafa (PSV) provides industrial equipment, particularly equipment needed in the Iran power and electricity industry, providing engineering services for domestic manufacturers and educational services for their employees.

Result of a large-scale activity

Fanavaran Pooya Sanat Vafa held a series of technical seminars on the products of Izolyator at Iranian power plants.

These seminars are development of the large-scale work that Izolyator held in Iran in the autumn, namely, seminars and business meetings were held in the Tavanir energy company of the Iranian Ministry of Energy and on transformer plant of Iran Transfo Corp. with active participation in all PSV events.

PSV technical seminars were held at the Khoozestan Regional Electric Company, Ahwaz, at the Mofateh Power Plant,



Energy companies specialists were highly involved in seminar activities



One of the workshops of Fanavaran Pooya Sanat Vafe in Iran

Hamedan and the Gilan Power Plant, Rasht.

Energy companies specialists were highly involved in seminar activities. Besides that and thanks to the support of PSV, in the corporate magazine of Tavanir an article devoted to the Izolyator plant's autumn seminar was published and it contained a detailed overview of the advantages of using high-voltage RIP-bushings.

We appreciate the company PSV for its active cooperation and successful actions promoting innovative technologies in the Iranian electrical market! ■

With special interest



Representatives of Polish companies PSE S.A. and Eitel Networks at the Izolyator test center

In February Izolyator was visited by representatives of the Polish state power grid company Polskie Sieci Elektroenergetyczne S.A. and the Polish engineering company Eitel Networks.

PSE S.A. was represented by: Maciej Lechman, Main Specialist, Warszawa; Dawid Pogodzinski, Transformer Specialist, Radom; Andrzej Zimka, Area Specialist, Radom.

Eitel Networks was represented by Ireneusz Zawadski.

The business part of the meeting was opened with a presentation of the Izolyator plant, during which Manager of International Business

Development Department Alexander Znamenskiy, paid particular attention to the technical characteristics and advantages of RIP bushings, as well as the benefits



Representatives of Polish companies PSE S.A. and Eitel Networks during presentation of high-voltage bushings with internal RIP insulation production technology



Representatives of Polish companies PSE S.A. and Eitel Networks are at the station of external polymer insulation making

of cooperation with Izolyator and its client-oriented business approach in work with partners.

Then our guests took a tour of the enterprise's production facilities, during which the latest technologies of RIP-bushings production were presented to them.

Guests paid particular interest to the new equipment developed by Hübers for the manufacture of external polymer insulation put into operation in October 2018. When designing this equipment, innovative technical solutions were used to ensure the highest precision and quality of the production process. Full automation of the process guarantees high quality of manufactured insulation that does not require additional processing, and a significant reduction in production cycle.

After the excursion to the Izolyator test center, the guests took part in the standardized testing of a 550 kV bushing designed and manufactured for PSE S.A.

The tests were carried out in full compliance with IEC Standard 60137:2017 and ended successfully.

At Izolyator corporate museum, the visitors got acquainted with the century-old history and today's achievements of the company. All events of the business visit were a good experience and an example of fruitful dialogue with an open exchange of useful information.

Polish guests noted the highest technological level and significant production capacity of Izolyator plant, which develops and produces innovative power equipment in compliance with strict EU and international standards.

Both parties expressed mutual interest in business development and outlined the next steps for future cooperation. ■



All the products supplied by Izolyator are strictly in line with the technical specifications of the quality certificate.

Tamaz Sharikadze,
Director of Aethos Ltd.

Aethos Ltd. appreciates Massa Ltd. for the positive experience of cooperation in the supply of high-voltage bushings.

All the products supplied by the plant were strictly in line with the technical specifications of the quality certificate and had no defects. No complaints on quality.

During our cooperation at the negotiation stage and further work on settlement of technical characteristics and specifications, all issues were resolved promptly, which indicates the high professionalism of all departments of Massa Ltd.

With hope for further success of mutual business and steady increase in shipments.

Aetos Ltd. is an importer of electrical equipment of world's leading OEMs for the needs of power industry companies in Georgia.

The power generation sector of Georgia is dominated by small and mid-size hydropower plants. Most of them are able to function in year-round mode.

In 2016, the total capacity of the 59 hydroelectric power plants was 2.7 GW, the three combined heat and power plants - 700 MW.

In the structure of electricity production, the share of hydroelectric power plants accounts for about 78%, CHP - 22%. The country's hydro potential has been mastered by about 25%, so Georgia has the opportunity to create 30-40 GW of new capacity.

Successful results of the year



Installation of the first 750 kV bushing with RIP-insulation in Belarus, manufactured by Izolyator, L-R: Dmitry Mashinistov, Anatoly Tereshchuk, leading engineer of Riko representative office in Belarus and Vyacheslav Maskalik, head of the 750kV «Belorusskaya» substation



Participants of the meeting at Izolyator plant, L-R: Alexander Slavinsky, Sergey Roussentsov, commercial director of AllianceEnergо and Maxim Osipov

Commercial director of AllianceEnergо Sergey Roussentsov visited Izolyator plant. The meeting summed up annual result of joint activities with energy enterprises of Belarus.

One of the significant events of 2018 was the installation of the first in country RIP bushing with 750 kV voltage. The installation was carried out in a shunt reactor at the "Belorusskaya" 750kV power station. "Izolyator" plant specialists took part in

this event. During this meeting partners discussed significant trends and issues of strategic planning aiming to strengthen and further improve already fruitful long-term partnerships with enterprises of the Belarus Energy complex.

Both sides stated exceptional importance of further cooperation, given the historical context of relations between Russia and Belarus. ■

New Project with Asia Trafo

Dmitry Karasev, Senior Manager of CIS sales at Izolyator, met with representatives of the management of the Asia Trafo transformer plant in Shymkent, Kazakhstan.

Chief Technical Officer Omar Asanov and Power Transformers Chief Designer Adilbek Tazhibaev represented the other party.

The meeting participants agreed on the specification and total amount of deliveries of Isolyator high-voltage bushings coming in 2019. The parties also agreed on all issues regarding the planning and implementation of a new large-scale joint project.

We appreciate Asia Trafo for the invitation and great practical contribution to the development of cooperation between our enterprises! ■



Talks at Asia Trafo in Kazakhstan, L-R: Dmitry Karasev, Technical director at Asia Trafo Omar Asanov and chief designer power transformer at Asia Trafo Adilbek Tajibaev

Chasing the new peak

Dmitriy Karasev, senior manager of CIS sales at Izolyator, met with management of the Republican unitary enterprise Chernomorenergo in Abkhazia.

The guest was welcomed by: General Director Aslan Basariya, deputy general director for high-voltage networks Ruslan Kvarchia and chief engineer Tengiz Girdzhinba.

The parties discussed plans for cooperation in the nearest future and

mid-term, as well as ways to improve the effectiveness of practical cooperation in the implementation of joint projects.

Both parties confirmed their strong intention to develop business relations on a permanent and long-term basis.

We appreciate Chernomorenergo for invitation and desire to develop cooperation! ■



Inguri Hydroelectric Power Plant (Photo: Chernomorenergo RUE)

Promising direction



Head of the insulation and surge protection department of Moldelectrica Vladimir Sitnikov and Anna Zubakova during a business meeting in the Moldelectrica in Moldova

Anna Zubakova, CIS and Baltic sales manager at Izolyator, took part in a business meeting with the State-owned Enterprise Moldelectrica in Moldova in March.

The guest was welcomed by the head of the insulation and surge protection department Vladimir Sitnikov and the deputy head of the insulation and surge protection department Tatyana Kondratyuk.

Ivan Lupashko, General Director of Valkyrie LLC, took part in the negotiations.

The meeting was mainly devoted to various aspects of the use of high-voltage bushings with solid internal insulation, such as: advantages over similar products with other types of insulation, successful experience in the use of power systems in other countries, operating and diagnostics, interchangeability issues with bushings of outdated structures, etc.

Finalizing the meeting, the parties identified mutual goals and outlined a plan for further interaction.

We appreciate Moldelectrica for invitation and cooperation! ■

GEOGRAPHY OF OPERATIONS



-  Kentau transformer plant
-  Togliatti Transformer
-  Vitebskenergo
-  GK Dnistrenergo
-  ZREW Transformatory

-  Balikesir Elektromekanik Sanayi Tesisleri A. S
-  Power machines - Toshiba. High-voltage transformers
-  Grodnoenergo
-  SVEL Group
-  TBEA Co., Ltd.

-  CG Power and Industrial Solutions Limited
-  Siemens AG
-  Zaporozhtransformer
-  Fortum
-  Uralsvtyazhmasht

I QUARTER 2019

9 COUNTRIES



-  Belarus
-  Vietnam
-  India
-  Kazakhstan
-  China
-  Poland
-  Russia
-  Ukraine
-  Estonia



- | | | |
|---|--|---|
|  National Power Grid of Kyrgyzstan |  Chirchiq transformer plant |  Production Enterprise Electrozavod JSC |
|  VNIIR Hydroelectroautomatica |  Moscow united power grid company |  Federal Grid Company of Unified Energy System |
|  Osteron |  Hydrorepair-VKK |  Electroshield Samara |
|  Electricgeneration INTER RAO |  ATEF ATEF Group |  Energy Standard |
|  Gomelenergo |  Unipro |  Rosseti |



Andrey Shornikov
Head of International
Business Development
dept. at Izolyator



We pay great attention to the deadlines for the fulfillment of all our obligations and carefully plan our upcoming work with our partners around the world.

The first quarter of 2019 was significant in this sense: we are waiting for a busy year and it is important to prepare for the upcoming projects and events.

As usual we communicated a lot and productively with our Indian partners. The main topic was the preparation of the event - jointly with the Mehru Electrical & Mechanical Engineers (P) Ltd. Indian Transformer Plant – participation in the 6th International Exhibition and Conference GridTech 2019 at the Pragati Maidan Exhibition Center in New Delhi, India.

In addition, this May, our company holds a comprehensive open international event dedicated to the beginning of the supply of bushings with solid internal RIP insulation for ultra-high voltage classes 420kV / 3000A and 800kV / 2000A to India. An event of this scale is the undoubted recognition of the quality of Izolyator products both in India and around the world.

We invite all our partners to take part in an open international conference and series of standard tests in laboratory in Bangalore (India)



Yaroslav Sedov
International Business
Development Manager



Izolyator is known in many countries of the world due to its extensive accumulated expertise and huge experience in production, diagnostics and service of high-voltage bushings of various types and voltage classes.

In the first quarter, we not only received guests in our factory, but also actively held meetings and negotiations with partners in other countries.

Visit of representatives of the Polish state power grid company Polskie Sieci Elektroenergetyczne S.A. and the Polish engineering company Eltel Networks looks very promising for the future cooperation.

We also have ambitious plans to work with partners in the countries of the Middle East, such as Turkey, Iran, and Pakistan. Among the events planned for 2019, it is necessary to especially note the upcoming visit to Saudi Arabia and, in particular, negotiations with the power grid company Saudi Electricity Company.

We set ourselves global goal of entering the world market and in 2019 we plan to implement truly ambitious and effective projects for the supply of modern electrical products.



Maxim Osipov
Head of CIS Sales
at Izolyator



We take full responsibility for the tasks facing us and are grateful to our partners for their mutual interest and timely feedback. We have become reliable partners and are proud to contribute to the development of the electric power industry not only in Russia, but also in the CIS countries.

In recent years, our company has strengthened relations with electric grid companies and manufacturers of power equipment in the CIS countries.

The establishment of open dialogue with our partners is of great importance for us. These are business visits, during which plans and prospects for cooperation were discussed, but it is precisely such events that in fact are of particular importance, since they confirm mutual interest.

Among the shipments of the first quarter it is possible to distinguish the supply of 750 kV bushings for the needs of Ukrainian NPPs.

This is a large order and work on it will be continued in the second quarter.

Traditionally, we plan to talk about the latest developments and the most advanced technologies of high-voltage bushings production during technical seminars that we will hold for our customers throughout the year. We are looking forward to all the forthcoming meetings and new projects!

EXPORT

Q1 2019

High-voltage bushings shipments



Overseas:
China, India, Poland,
Vietnam, Estonia



CIS countries:
Belarus,
Kazakhstan, Ukraine

> **35** bushings shipped
to power industry enterprises
in Poland

> **40** bushings
shipped to
CIS countries

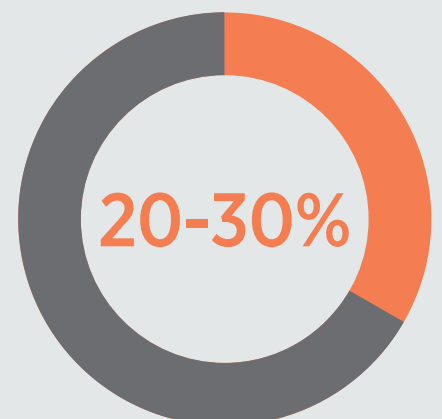
> **50**
units
of 52-800 kV
bushings shipped
to power industry
enterprises in India

> **150**
35-750 kV
bushings shipped
overseas



Over
30
countries
of the CIS
and other
countries
of the world

Export share
in sales





The successful joint work of our enterprises allows us to recommend Izolyator as a reliable manufacturer of high-voltage bushings of consistently high quality.

Vladimir Kalaushchenko,
General Director
UETM JSC

We express sincere gratitude to Izolyator for many years of fruitful cooperation.

The successful joint work of our enterprises allows us to recommend Izolyator as a reliable and conscientious manufacturer of high-voltage bushings of consistently high quality. Isolator high-voltage bushings always meet modern standards and requirements.

I want to note the well-organized work and the high professionalism of Izolyator employees, a special thanks we give to the commercial service for the clear and timely solution of all the inquiries from us.

Uralelectrotyazhmash (UETM) is the biggest Russian developer and producer of electric power equipment for generation, transmission, distribution and consumption of energy.

High-voltage equipment, transformers and reactors, converter equipment and electric machines of UETM brand are world known and enjoy a good reputation.

Uralelectrotyazhmash is a diversified electrical engineering company producing more than 2000 product items for 3000 customers in Russia and abroad.

The company is located in Yekaterinburg.

Visit to Uralelectrotyazhmash

On February 2019, Maxim Zagrebin, Head of OEM sales of Izolyator plant, visited the Uralelectrotyazhmash transformer plant in Yekaterinburg.

Leonid Meshavkin, head of procurement for the transformer production complex represented the other party.

During the talks, the parties discussed the progress of joint projects, highlighting the successful tests of the UETM transformer with Izolyator

110 kV bushings, held before in the KEMA Laboratories — CZ in the Czech Republic.

One of the most important results of the working meeting was clarification and update of the development strategy between companies, which is being viewed as solid basis for successful long-term cooperation.

We appreciate Uralelectrotyazhmash for invitation and effective cooperation. ■



L-R: Leonid Meshavkin, Head of procurement for UETM transformers production complex and Maxim Zagrebin at the Uralelectrotyazhmash plant in Yekaterinburg

Common goals



Maxim Zagrebin (left) and SVEL Group Procurement Manager Danila Safin at the SVEL - Power Transformers plant in Yekaterinburg. In the background - a SVEL transformer with Izolyator 330kV bushings

In February Maxim Zagrebin, Head of OEM sales of Izolyator, participated in a business meeting with SVEL Group in Yekaterinburg.

Danila Safin, Procurement manager represented the SVEL Group party during the meeting.

Intermediate results of joint activities were summed up at the meeting, including successful tests of the SVEL transformer with Izolyator 330kV bushings, which were held at the KEMA Laboratories—CZ in the Czech Republic.

During the negotiations, parties discussed several issues aiming to increase efficiency of interaction in the work on joint projects. ■

Today's success is a solid base for the future



At the Power Machines - Toshiba High-voltage Transformers plant, L-R: PMTT Business Development Director Konstantin Stafeev, Maxim Zagrebin, and PMTT Senior Design Engineer Alexander Smimov. In the background to the right - a transformer with 252kV high-voltage bushing produced by Izolyator.

Izolyator representative visited Power Machines - Toshiba High-voltage Transformers plant in the city of St. Petersburg in February.

During the visit, several meetings with PMTT management took place, namely: CEO Andrey Pischikov, Chief Designer Andrey Sidelnikov, Head of Sales Mikhail Melshin, Head of Procurement, Sergey Suvorin, Business Development Director Konstantin Stafeev, Deputy Chief Designer Alexander Yuzhakov.

Parties discussed on-going business as well as plans for the development of cooperation for 2019. Following the discussion, the parties noted the successful business results and expressed their intention to actively develop further mutual cooperation.

We appreciate Power Machines – Toshiba High-voltage Transformers for invitation, warm hospitality and effective cooperation. ■

Big scale teamwork ahead



Izolyator 220kV bushings installed on Togliatti Transformer products

In Q1 2019, Maxim Zagrebin met with top-management of the Togliatti Transformer plant.

Guest was welcomed by technical director Andrey Kanivets, council to general director Sergey Sentemov, sales director Artem Bogodyazh, deputy sales director Yuri Volchenko, head of partner cooperation department Anna Roslyakova and senior engineer of the procurement

department, Anton Chuvashov

During the meeting parties discussed issues of further cooperation on new CIS projects, due to be launched in 2019.

We appreciate Togliatti Transformer for invitation and fruitful cooperation. ■

Acquaintance with production



Head of sales at Electroapparat Ilya Arsenyev and Maxim Zagrebin visiting Electroapparat Plant in St. Petersburg

On March 2019, Maxim Zagrebin, Head OEM sales at Izolyator, visited the VO Elektroapparat in St. Petersburg.

The guest was welcomed by head of sales Ilya Arsenyev and head of supply Maxim Pugachev.

Upon brief tour of the enterprise parties proceeded to the business meeting.

The main topics of discussion were the common interests of the two enterprises and possible directions for the development of mutually beneficial cooperation on a long-term basis.

The parties agreed to continue the discussion at a more detailed level including technical and organizational aspects of joint activities.

We appreciate VO Elektroapparat for the invitation and fruitful dialogue! ■

In the spotlight - promising projects



Participants of the meeting with Energy Standard company. L-R: Maxim Zagrebin, deputy general director Alexander Gumenyuk and transformer equipment service department representative Yakov Filonov

Maxim Zagrebin, Head of OEM sales at Izolyator plant, visited Energy Standard Company.

Meeting purpose was to sum up the 2018 business results and to discuss further cooperation development.

The parties stressed mutual success of activities throughout the year and discussed a number of promising projects. Meeting bottom line is an action plan for future cooperation improvement, mutual goals and objectives for business relations development.

We appreciate Energy Standard for invitation, warm hospitality and effective cooperation! ■



Izolyator has proved itself a reliable and highly professional partner

Dmitry Fomichev,
General Director VNIIR
Hydroelectroautomation Ltd.

Izolyator has been a reliable partner to us since 2016. During our cooperation, Massa Ltd has proved a reliable and highly professional partner, which timely and fully meets contract obligations and verbal arrangements in line with the Russian Federation legislation taking into consideration the partner's interests. We highly appreciate Massa Ltd as a stable and reliable partner and look forward to further developing our partnership, built on trust, understanding and ability to find win-win solutions.

VNIIR Hydroelectroautomation JSC offers its customers a complete services range in design, configuration, supply, installation, commissioning and putting into operation of power facilities.

The enterprise operates as a full cycle engineering company from identification of customer requirements and feasibility study to putting the facility into operation.

VNIIR Hydroelectroautomation JSC is based on the All-Russian Scientific Research Institute of Relay-engineering (VNIIR).

Company specialists greatly benefit from unique knowledge and experience of VNIIR as well as from electric equipment and automation production potential of other ABS Electro Group companies.

Engineering: theory and practice

Vitaly Shakhov, Head of Electric shop section, Leningrad NPP-2 and Konstantin Klyuchnikov, Head of power equipment sourcing, Titan-2 met their colleagues at Izolyator.

Guests were welcomed by R&D Director Konstantin Sipilkin, Director of Partner Relations Oleg Bakulin, Deputy Chief Designer Pavel Kiryukhin and Head of SVN-Service Dmitry Mashinistov.

At the business meeting, the parties discussed cooperation prospects in high-voltage bushings delivery for the

transformer equipment of the Leningrad NPP-2 power unit, which is now under construction.

The technical issues were discussed at the manufacturing facility, where the Lead technical support specialist Victor Kiryukhin familiarized the visitors with the production technology and key features of high-voltage bushings with RIP insulation. The talks went successfully. The parties agreed on further contacts and business relations development. ■



At the assembly shop of Izolyator plant, L-R: Victor Kiryukhin, Head of power equipment sourcing Konstantin Klyuchnikov, Titan-2 Concern, Head of Electric shop section Vitaly Shakhov, Leningrad NPP-2 and Oleg Bakulin

Successful Inspection



Participants of the Izolyator High-Voltage bushings Inspection, manufactured for the Leningrad NPP, L-R: Leonid Takhtarov, representative of Leningrad NPP, Tatyana Golkina, representative of VO Safety JSC, and Konstantin Ivanov, head of department at Favorstroy

In March Izolyator held an acceptance inspection of high-voltage bushings tests with the participation of representatives of the Leningrad NPP and VO Safety JSC.

The acceptance tests of inputs of 110 and 330 kV voltage classes made for the Leningrad NPP were done.

The inspection team included a representative of the Leningrad NPP, Leonid Takhtarov, and a representative of VO Safety JSC, Tatyana Golkina.

Dmitry Ivanov, Head of Izolyator Test Center, led the tests. Alexander Novikov, Quality Director at Izolyator, Oleg Bakulin, Director of Partner Relations at Izolyator, and Konstantin Ivanov, head of department at Favorstroy, took an active part in testing.

The tests were completed successfully, confirming the compliance of the Izolyator high-voltage bushings with the highest requirements for equipment in the nuclear power industry. ■



Meeting of specialists of Tyumenenergo in Kogalym

Sharing professional experience

Izolyator joined the annual meeting of chief engineers, line managers of district electric networks, industrial safety and production monitoring managers, team leaders of sub-station and ETL units of Tyumenenergo JSC branches, which was held in Kogalym.

Izolyator was represented by the Lead Technical Support Specialist Viktor Kiryukhin, who made a report "Innovative advanced designs of Izolyator. High-voltage RIN bushings".

At the meeting, several reports of participants were listened and the audience discussed issues of operation and development of the power grid, sharing professional experience. The participants also summarized the results of the decisions of the previous meeting and outlined plans for this year.

We appreciate Tyumenenergo JSC for the invitation and a productive cooperation! ■

With attention to questions



Viktor Kiryukhin, speaker for Izolyator during workshop for technical specialists of Regional Electrical Networks in Novosibirsk

Izolyator arranged a workshop for technical specialists of Regional Electric Networks in Novosibirsk. The event was held at the EnergoCenter Private Educational Centre for Advanced Professional Education.

Izolyator was represented by Oleg Bakulin, Director of Partner Relations, and Viktor Kiryukhin, Lead Technical Support Specialist.

During the seminar several topics were covered in detail, including the features of installation, diagnostics and maintenance of high-voltage bushings with solid internal RIP insulation, as well as new and emerging technologies of Izolyator product line-up.

The special group's attention was drawn to discussion of the basic standards and maintenance requirements of high-voltage bushings with solid internal insulation.

The workshop participants noted the exceptional productivity of this form of cooperation between the two companies.

We appreciate the company Regional Electric Networks and the EnergoCenter Educational Centre for invitation and highest professional level of workshop organization! ■

Workshop in Transenergo - Russian Railways



Photo: Russian Railways

Izolyator arranged a workshop for technical specialists of Transenergo – Russian Railways in Novosibirsk.

Izolyator was represented by Oleg Bakulin, Director of Partner Relations, and Viktor Kiryukhin, Lead Technical Support Specialist.

The workshop was attended by technical specialists of the Novosibirsk power supply facility of Transenergo – Russian Railways.

In the first part of the workshop, Izolyator was presented, its production capacity and innovative products of the enterprise, namely high-voltage bushings with solid internal RIN insulation.

The second part of the seminar was devoted to the successful experience of high-voltage RIP-bushings usage, their operation and diagnostics at power facilities.

We appreciate Transenergo – Russian Railways for invitation and deep involvement in the workshop activity! ■

38 | System of online-diagnostics and monitoring of transformer RIP bushings under operating voltage



Construction design of the connecting device to the measuring tap with built-in current transformer

The article is dedicated to the issue of diagnosing and monitoring technical condition of transformer bushings with RIP insulation under operating voltage. Here, we present results of continuous monitoring systems testing at operating facilities. The method to diagnose coupling capacitors was put in test operation. As an experiment, we imitated a developing defect by shortening one of the coupling capacitor's elements.

In the modern power industry, equipping high-voltage equipment with systems of continuous monitoring is becoming an important measure among others, ensuring reliability of operation of power facilities. With development and reorganization of electric power sector there is a growing attention given the issue of implementation of systems of diagnosing and monitoring of high-voltage equipment in real time mode with the goal of the technical condition evaluation of the monitored units and identification of defect on early stages of their development.

The problem of ensuring a reliable operation of high-voltage bushings is going to stay relevant in many decades to come. As of today, there are a lot of transformer bushings in operation, which are a critical component of power transformers. In terms of consequences, damage of high-voltage bushings can be referred to as a grave defect of transformer, leading to fires, explosions and injury of neighboring equipment.

Presently, there are various systems of diagnosing and monitoring of high-voltage bushings in operation. They are

produced both by domestic and foreign manufacturers and differ in their execution, cost, etc.

According to the acting standard of Rosseti PJSC «Scopes and norms of electrical equipment testing», it is recommended to control insulation on condenser type bushings with nominal voltage 110 kV and higher under operating voltage. For the bushings that are checked under operating voltage, measuring resistance of the insulation, dielectric loss tangent measurements and insulation capacitance (except measuring resistance of insulation and tg) in operation can be done only when poor results of insulation control under operating voltage are received.

In terms of construction design of the internal insulation, HV RIP bushings are referred to air-tight bushings of condenser type and have the main insulation as an insulation core with

current-conductive liners, which helps to achieve equalizing of the electric field both in radial and axial directions. A high-voltage bushing with RIP insulation consists of a solid insulator core, made by winding of insulating paper on a central tube with subsequent saturation in epoxy compound. A special lead is connected to the last liner for the purposes of measuring insulation on a bushing, the so-called measuring tap.

Among the key signals of deterioration of the technical condition of a bushing we can name changes in insulation characteristics (level of humidity), puncture of clearance between the conductive liners.

The key parameters allowing for finding defects in the insulation of transformer bushings are accepted to be insulation capacitance, dielectric loss tangent and partial discharge level.

The dielectric loss tangent is insufficiently informative for evaluating a RIP bushing condition in case of a local defect development because of the intermittent nature of occurrence at sequential puncture of clearance between the liners just as the partial discharge level, which does not exclude incorrect evaluations of the bushing's condition. With the overlap of insulating clearance, i.e. short circuit between two liners, the number of series-connected in the replacement scheme of the bushing elemental capacitors gets changed leading to an increase of capacitance of the main insulation.

In the result of capacitance increase, the current, flowing through the bushing insulation, increases proportionally. When controlling live bushings, the most objective parameter helping to find an internal defect - namely, puncture of insulation between liners - is capacitance of the main insulation.

To diagnose and monitor insulation condition of transformer RIP bushings under operating voltage, the authors tested a method of condition control on a bushing in a real time mode.

The essence of the method similarly to the coupling capacitors diagnostic method consists in the following capabilities: diagnosing and monitoring the insulation condition of a live unit by measuring current values, which flows through the insulation of the bushings in real time mode; defining operating voltage and frequency of the network in real time mode; assessment of the bushing capacitance value using the current, voltage and frequency measurements; comparison of the assessed capacitance value with the value, calculated at the

time of the control system commissioning under voltage.

Considering the small values of the active current, we disregard it. In view of insufficiently informative value of the dielectric loss tangent for finding local defects, the value of the active current is not measured and used for tangent delta calculation.

At continuous control of the bushing condition, there is a risk of damaging the insulation of the measuring tap plate at excessive voltage. Such voltage surge may occur as a consequence of the opening of the circuit of the measuring tap connection with the grounding or in case of voltage swells occurrence in the network at long length of the wire that grounds the measuring tap, which may lead to the puncture of insulation of the measuring tap plates, later damaging the bushing.

In systems of continuous control of insulation condition, they use a CZ reservoir for protection against opening of the measuring circuit. In insulation control devices, they install an intermediary matching transformer. For measuring current values, which flows through a live bushing insulation, it is offered to use a multifunction measuring converter of electric system parameters with a high-precision external current transformer as one of elements of the diagnosing and monitoring system.

Inside the attaching assembly (hood) they install an external current transformer, through the magnetic conductor aperture of which the contact grounding unit of the measuring tap passes without opening the grounding circuit, which is a primary winding of that current transformer. The linear dimensions of the grounding circuit elements are kept as provisioned by the manufacturing plant.

There is no need in doing additional steps to decrease swells in the insulation because of the neglectfully small parameters (inductivity, active resistance) of the grounding elements.

Changing the construction design of the measuring tap device for different modifications and installation inside the hood of the external current transformer should be coordinated with the manufacturing plant.

At the diagnostic cabinet of the bushing, where the multifunction measuring converter is placed, it is suggested to install a device for collection and transmission of information - communication controller, connected to the digital output of the converter.

Application of this online diagnosing system of RIP bushings under operating voltage and the dissolved gases moni-

toring system in real time mode will allow for meeting the required conditions for checking the technical condition of power transformers.

The tested method of diagnosing and monitoring of RIP bushings is expedient for use in view of its sufficient effectiveness in identification of internal defects at the bushing at the initial stage of their development and secure execution of the measuring tap connecting devices, eliminating damage of the insulation of the measuring plate in the result of interference of the measuring circuits to the grounding circuit of the measuring tap.

Based on article of the branch of Tyumenenergo JSC - Surgut electric networks: V. BUTKEVICH, 1st Deputy Director - Chief Engineer, I. URAZALIEV, Deputy Head of Insulation and Surge Protection Service of the branch, D. FIRSOV, Lead Engineer at the Service of corporate and technological DCS at the Electric energy. Transmission and Distribution Magazine

Comment of Izolyator

It is important to say that the measuring tap assembly is a critical component of a high-voltage bushing construction, which could lead to the entire bushing damage in misused. So, it is highly undesirable to make any changes to it compared to the factory construction. The above especially concerns the construction and execution of grounding and sealing the measuring tap that influence the bushing's performance. Should a need to take measurements on live bushings arise, there is a DB/2 sensor coming with the bushings, to the contacts of which one can connect the wire of the measuring device. This construction has been tested, proved by operational experience, so we are confident of it and recommend it for any bushings with RIP insulation.

When placing current transformer inside the hood of the measuring tap, as said above, it is vitally important to keep the existing grounding assembly, which seems impossible to do without changing the construction of the hood since placing a transformer inside the existing hood appears to be an impossible task. Besides, in modern bushings designs, the measuring tap/s grounding is done with the help of a special multicontact, which makes it impossible to position a transformer on the pin of the measuring tap. Still, if it were possible, than it could be only possible with serious amendments to the construction of grounding — a highly unlikely operation to do as already said before.



All high-voltage Izolyator bushings are delivered on time, which allows you to plan replacement work without any delay.

Andrey Gorbunov,
Director of main equipment
operation and maintenance
MPS Center

Power facilities of MPS Center purchased 500 kV high-voltage bushings of the "Oil-SF6" type with solid RIP insulation produced by Izolyator. The bushings are mounted on transformer equipment and successfully put into operation at the facilities of the Moscow Energy Ring.

Our company acquired the first bushings of this type back in 2017 to replace the ones of a foreign manufacturer. The equipment was installed and successfully commissioned. All work was carried out strictly under the supervision of the chief engineer of Izolyator. In 2018, we continued this practice and purchased 14 more pieces of equipment. All high-voltage Izolyator bushings are delivered on time, which allows you to plan replacement work without delay.

Main power system of the Centre (MPS Centre) operates on the territory of Central and North-Western Federal Districts. The service area of the branch includes 17 federal subjects with 38 million inhabitants.

MPS Center is responsible for the continuous operation of 23.157 thousand km of power lines and 151 substations with a total transformer capacity of 87 270 MVA. The branch provides the electrical connection of the Center with the power systems of the South, North-West, Volga, and Ukraine.

There are six main electric grid enterprises (PMES) — Valdai, Verkhne-Donskoe, Vologda, Moscow, Priokskoe and Chernozemnoe, as well as the Bely Rast personnel training center.

MPS Center employs over 3800 people.

Capacity of the 500 kV "Chagino" substation increased

The transformer capacity of the substation, which provides electricity to the south and south-east of Moscow, has been increased to 2.2 thousand MVA. The works were performed by FGC UES as part of a comprehensive reconstruction of a power facility, one of the three most powerful in the capital. The project will be fully completed by 2021, its total cost is 17.8 billion rubles. As a result, conditions will be created for connecting new consumers to the system and the reliability of the Moscow energy system will also be increased.

Two new power transformers with a total power of 200 MVA are installed in closed chambers. Due to this, climatic impacts on equipment are eliminated, noise loads are reduced, fire safety is enhanced due to the use of a gas fire extinguishing system.

Earlier, three new autotransformers with total capacity of 750 MVA were installed at the substation, a 220 kV gas-insulated switchgear (GIS) was built, power lines were re-installed, microprocessor equipment for relay protection and automation as well as modern automated process control system (APCS) were put into operation.



220 and 500 kV Izolyator bushings on a transformer of the FGC UES substation

At the next stages, two groups of single-phase autotransformers (2x3x167 MVA) and a three-phase autotransformer (250 MVA) with a total capacity of 1250 MVA will be replaced by new ones. Also at the substation will be mounted a 500 kV GIS. The project provides for the dismantling of old equipment and substation

buildings, land reclamation. As a result, the territory occupied by Chagino will be halved. The substation, built in 1958, will be transformed into a "closed type" power facility - high-tech, compact, reliable, environmentally friendly. ■

Based on materials of FGC UES

Two Volga region substations upgraded



Isolator bushings of 220 and 110 kV voltage classes at the transformer of the FGC UES substation

FGC UES has completed the replacement of high-voltage bushings for transformer equipment at 500 kV Penza-2 and 220 kV Abashevo substations. As a result, the reliability of power supply to consumers in the Penza Region and the Cheboksary District of the Republic of Chuvashia, including compressor stations of Gazprom pipeline system, has been increased.

Russian-made high-voltage bushings with solid RIP insulation based on vacuum-dried and epoxy-impregnated paper were used. New equipment has high reliability and fire safety.

The total power capacity of the 500 kV Penza-2 substation is 751 MVA. The power supply to consumers in the Penza region, including such large industrial enterprises as the Tyazhpromarmatura plant, depends on its uninterrupted operation. In addition, the power facility provides transit via the 500 kV Tambov-Penza line between the power systems of the Center and the Volga.

The total capacity of the 220 kV Abashevo substation is 189 MVA. It provides electricity to consumers in the northern regions of the Republic of Chuvashia, including Gazprom's infrastructure facilities located on their territory. ■

Based on materials of FGC UES

Construction of a new power transmission line for Transsib has begun

FGC UES has begun the construction of a 220 kV transmission line Minusinskaya-opornaya - Koshurnikovo tyagovaya - Sayanskaya tyagovaya - Kamala-1 430 km long. Investment in the project will amount to 9.3 billion rubles. Putting the facility into operation will create opportunities to increase the capacity of the section of the Trans-Siberian Railway, passing through the territory of the Krasnoyarsk Krai, and increase the reliability of electricity supply in the region with a population of about 2.9 million people.

The route of the power line runs through the central, eastern and southern regions of the Krasnoyarsk Krai in parallel to the existing 220 kV transmission line, which provides the power supply of the Krasnoyarsk railroad. A new power transmission line will cross several rivers, including Tuba - the right tributary of the Yenisei River, where a 1.5 km crossing will be erected with a height of supports over 70 meters.

For the first time in the Krasnoyarsk Krai, highly reliable, multi-faceted supports will be used in the construction of the transmission line. Their main advantages are vandal resistance, resistance to ice-wind and corrosion effects. Their service life is 1.5-2 times longer than that of lattice and reinforced concrete supports.

To connect the new line, FGC UES will expand the existing 500 kV Kamala-1 and 220 kV Minusinskaya-opornaya substations, where new 220 kV line cells equipped with modern SF6 circuit breakers will be installed.

The construction of an 220 kV overhead transmission line Minusinskaya-opornaya - Koshurnikovo tyagovaya - Sayanskaya tyagovaya - Kamala-1

is included in the Comprehensive Plan for the modernization and expansion of infrastructure, approved by the Government of the Russian Federation No. 2101-r dated 30.09.2018, as well as in the FGC UES macro project on the development of an external power supply system for the Baikal-Amur and Trans-Siberian Railways. ■

Based on materials of FGC UES



Photo: FGC UES



Maxim Zagrebin
Head of OEM Sales
at Izolyator



Active cooperation with Russian and foreign manufacturers of transformer equipment is an integral part of our work. We pay great attention to the feedback we receive in the course of personal meetings. This is a valuable opportunity to constantly improve teamwork, making it truly mutually beneficial and fruitful.

In the first quarter, we actively discussed and planned international projects for the period 2019-2022 related to the supply of transformer and reactor equipment, which will be utilizing bushings from Izolyator.

We are carrying out extensive work on the introduction of high-voltage bushings with solid RIN insulation, which has many advantages. Today, our company offers the most advanced technologies, which at the same time combine many years of successful experience and best practices.

This year we plan to actively develop the presence of the Izolyator company among manufacturers of transformer-reactor equipment in the CIS countries.



Oleg Bakulin
Director of Partner Relations
at Izolyator



It is always especially important for us to fulfill our obligations on time. And we continue to adhere to the same principle in 2019. So, in the first quarter we timely shipped high-voltage bushings to all our Russian partners, including a large delivery to power facilities of the Moscow United Electric Grid Company (PJSC MOESK), and also to IDGC of Urals, BSK LLC, Bashkirenergo LLC, IDGC of Center and Volga Region, Tyumenenergo, Lenenergo.

The tests of high-voltage bushings, carried out jointly with representatives of Smolensk NPP, Leningrad NPP and VO Safety JSC, have once again demonstrated that we work well and smoothly. Acceptance tests of 110, 330 and 750 kV bushings manufactured in accordance with the quality standards for nuclear power plants ended successfully, confirming that Izolyator products comply with the highest requirements.

It is especially important for us that this is the first experience in the history of the plant in the supply of 750 kV bushings with solid internal insulation and polymeric external insulation to the Rosenergoatom Corporation branches.

We are always happy both to visit our partners and meet them here at Izolyator plant.



Alexander Savinov
Director of Strategic Sales
at Izolyator



Building effective communication is really worth effort. Over the years we have learned from our own experience that face-to-face meetings, one-on-one answers to all major issues, and direct information about the benefits of modern technology is the best way for partners to reveal all the benefits and potential of full cooperation.

We see great involvement from our partners and are pleased to organize technical seminars on the most relevant topics: innovative developments, installation, operation and diagnostics of high-voltage bushings, etc.

Meetings on the design, technical characteristics, advantages and prospects of using high-voltage Izolyator bushings with solid RIP and RIN insulation, in turn, allow us to keep abreast of and feel what needs are in trend.

We are looking forward to implementation of new ambitious projects in cooperation with the electric grid, generating and electrical companies of Russia.

POWER INDUSTRY OF RUSSIA

Q1 2019

Parallel to the UES of Russia, the energy systems of the CIS countries operate:



Azerbaijan, Belarus, Georgia, Kazakhstan, and Ukraine. The power systems of Kyrgyzstan and Uzbekistan operate in parallel with the UES of Russia through the power system of Kazakhstan. Through the power system of Ukraine - the power system of Moldova.*

Public Joint-Stock Company
Federal Grid Company of the
Unified Energy System
(PJSC FGC UES)



946 high-voltage substations with installed capacity of

347 000 MW

143 600 km of power lines**

110+ bushings shipped to transformer plants in Russia



940+ 24-750 kV bushings shipped to Unified Energy System of Russia



70-80%

marketshare of high-voltage bushings in Russia and CIS countries



Unified Energy System of Russia (UES)



70 energy systems



748 power plants



239 812,2 MW
total power plant installed capacity of UES of Russia*



in **81** region



>10 700 power lines



Over **1 000 000 000** MWh
energy production of UES power plants

* According to JSC SO UES
** According to PJSC FGC UES



With the new brand ReCoTec® (Reinhausen Composite Technology) our product line-up is continuously expanding.

Kinga Kastenberger,
Area Sales Manager at Reinhausen Power Composites GmbH

Izolyator and MR Reinhausen Power Composites GmbH are looking back on a collaboration of almost 10 years. In these years we faced together challenges and opportunities, always finding a way to support each other and in this way to lay the foundation for an important partnership.

It is pleasure to have this business partnership with you. We both enjoy this partnership in terms of — profit, growth, goodwill and our friendship.

Now, facing the next decade in this partnership, we want to set new goals in expanding and strengthening our collaboration by finding new opportunities. MR is continuously investing in new technologies and expanding its portfolio to be able to give full support to its customers. We are convinced that together we can approach new markets and we set the goal to support Izolyator in its fast growing export business.

May the next decade strengthen our partnership and friendship and bring us further growth. We thank you for choosing us as your partner on this journey and we are looking forward to walk alongside also in the future.

Maschinenfabrik Reinhausen GmbH (MR) is a leading company within the Reinhausen Group. For 30 years, MR has designed and manufactured insulation tubes from glassfiber reinforced epoxy resin.

Based on this experience and extensive knowledge, MR expanded the company's activity in the field of insulation materials and began to produce composite hollow insulators, the quality of which meets the high standards of MR.

Sharing the best practices

In the end of February a presentation of new technologies of the German industrial company Maschinenfabrik Reinhausen GmbH took place at Izolyator.

The presentation was held by representatives of Reinhausen Power Composites GmbH: technical expert Eric Moual and Area Sales Manager Kinga Kastenberger

The presentation contained the technical characteristics and techno-

logical features of silicone of various types used in the manufacture of composite insulators, which, in turn, are used as external insulation of the high-voltage Izolyator bushings for ultrahigh voltages.

Finalizing the presentation, the parties discussed the results of on-going business and prospects for the development of cooperation. ■



New technologies presentation of the German company Maschinenfabrik Reinhausen GmbH at Izolyator

Destination - Czech Republic



Negotiations in Louny, Czech Republic, L-R: Jiří Blaha, Commercial Director of Elektroporcelán, Vladimír Romanov and Antonina Maslennikova

Izolyator representatives visited the plants of Elektroporcelán in Louny and Merklin, Czech Republic.

Izolyator company was represented by the head of the procurement department Vladimír Romanov and the purchasing manager Antonina Maslennikova. In Louny, guests were welcomed by Jiří Blaha, Commercial Director of Elektroporcelán.

Both parties summed up the results of business in 2018, noting significant achievements and the successful nature of mutual cooperation.

The parties specified the range of products supplied, agreed on common objectives and outlined an action plan for the development of business relations both in the nearest future and in the mid-term.

We appreciate the company Elektroporcelán for invitation, warm hospitality and effective cooperation! ■



Discussing cooperation between the partner companies at Kamyshlov plant Uralizolyator, L - Dmitry Abbakumov

Productive Dialogue

Deputy Commercial Director of Izolyator Dmitry Abbakumov took part in the working meeting at the Kamyshlov plant Uralizolyator.

In the meeting, organized by Kamyshlov plant Uralizolyator's management, the Minister of Industry and Science of Sverdlovsk region Sergey Perestoronin, Deputy Head of administration of Kamyshlov city district Elena Vlasova, Lead Specialist of machine building and defense industry and science sector of

Sverdlovsk region Dmitry Scherbakov, representatives of business partners of Uralizolyator plant took part.

The ways to increase efficiency of coordination between partners companies, main areas of cooperation in the near future, strategic priorities and common goals were discussed at the meeting.

We appreciate Kamyshlov plant Uralizolyator for an invitation and a productive dialogue. ■



Working meeting at Kamyshlov plant Uralizolyator

A Clear Plan With Perspective

Director in charge for commerce of Managing company TAU NefteHim Aleksey Nuzhdin paid a visit to Izolyator plant.

The guest was received by Konstantin Sipilkin, R&D Director, Dmitry Abbakumov, Deputy Commercial Director and Vladimir Romanov, Head of Purchasing.

The talks revolved around the issues of components and materials delivery for production of high-voltage bushings.



Vladimir Romanov and Director in charge for commerce of Managing company TAU NefteHim Aleksey Nuzhdin at the assembly shop of Izolyator plant

During a plant tour, the visitor saw a complete production process of high-voltage bushings with solid RIP and RIN insulation.

In the result of the visit, the parties outlined areas of mutually beneficial cooperation. ■



Talks with representatives of the Chinese company Hunan Yangdong Porcelain Insulators & Electric Co., Ltd at Izolyator plant, L-R: Vladimir Romanov, Dmitry Abbakumov, General Director of Impel Dmitry Martyshevsky, Marketing Manager at Hunan Yangdong Hu Ting and Vice-President at Hunan Yangdong Li Qigao.

Creating The Basis for Development

Representatives of the Chinese industrial company Hunan Yangdong Porcelain Insulators & Electric Co., Ltd and General Director of Impel Dmitry Martyshevsky made their first visit to Izolyator plant.

Hunan Yangdong Porcelain Insulators & Electric Co., Ltd was represented by Vice-President Li Qigao and Marketing Manager Hu Ting.

Dmitry Abbakumov, Deputy Commercial Director and Vladimir Romanov, Head of

Purchasing received the guests. Hunan Yangdong Porcelain Insulators & Electric Co., Ltd made a presentation about its products and the sides discussed issues of possible cooperation in deliveries of both porcelain and composite insulators for high-voltage external insulation applications.

The talks ended in success, with the parties' arrangements on further contacts and business relations development. ■



Dmitry Abbakumov
Deputy Commercial Director
Izolyator



We begin every year by creating plans and thinking on the results that we would like to achieve in the near future. Traditionally, the first quarter is made up of business meetings, business planning and scheduling follow up meetings. This important work allows us to always keep our promises.

In the beginning of January, we participated in the working meeting at the Kamyshlov plant Uralizolyator. Such meetings help to share opinions and hear not only production engineers but also representatives of the government.

Traditionally, we are happy to receive guest at our plant. In February, Director in charge for commerce of Managing company TAU NefteHim Aleksey Nuzhdin paid a visit to our company.

We are confident that such meaningful issues as supplies of competing parts and material for production of high-voltage bushings should be discussed in person. It is especially important when working with new suppliers.

Our experience shows that the mutual interest is a key driving factor of partnership.

III Forum of Exporters of the Moscow Region



Discussion on one of the topics at the III forum of exporters of the Moscow region

Izolyator participated in the III forum of exporters of the Moscow region.

The forum took place at the Government Palace of the Moscow region. The event was supported by the Export promotion fund of the Moscow region. The forum gathered more than 300 representatives of the busi-

ness community – existing and potential exporters of the region as well as representatives of the government, development institutions, expert and academic communities.

Deputy Commercial Director Dmitry Abbakumov represented Izolyator at the forum. ■

WE CREATE

A STABLE AND SUSTAINABLE SYSTEM OF
POWER SUPPLY



IZOLYATOR

PLANT | IN
FOUNDED

1896



**NEW MANUFACTURING FACILITY
IN PAVLOVSKAYA SLOBODA**

2007

launch of industrial facility
in Pavlovskaya Sloboda



special design office

300

highly qualified staff
members



advanced production technology

12 000

high-voltage bushings
a year



test center with the best
equipment

24 000

floor space



service center with an all-around
support

Julia Tyurina, Head of Personnel and Social Resources Management Department at Izolyator

Our team always has been the biggest asset of our company, that is why it is so important not only to develop production management systems, but also to carry out well-planned work to maximize the preservation of the most qualified personnel of the enterprise.

Hiring employees for industrial specialties, the specifics of our production play an important role - we have a number of unique labor specialties and professions that are not taught in educational system. For example, such as the Operator of insulation core winding machine, operator of saturation machine of electrical items, the varnish technician of electrical insulation products and materials, the chief engineer and others. Some of the employees are already senior in age, and we are faced with another problem: the replacement of their positions. After analyzing the current situation in our company, a project for the development of talent pool has been developed.

The main objective of the talent pool is to ensure high-quality continuous multi-level training of highly advanced personnel for the company. The implementation of this project includes several areas:

Talent pool training according to a specially developed annual on-the-job program with the involvement of highly qualified and experienced company employees at various levels, professional business coaches from leading educational institutions, and teachers from the Moscow Power Engineering Institute.

In general, as part of the implementation of the talent pool development program in 2018, Izolyator trained over 50 senior and top managers, over 40 managers and over 30 workers.

For training specific working professions in the company, the process of training reservists without interruption from the main activity according to a specially developed program is organized. Each reservist is assigned a mentor from among the best and most experienced specialists of the company.

The next stage of the project is organization of educational production practice on the basis of the company in partnership agreement with the Krasnogorsk professional college. 6 students of working specialties have completed the practice.

After graduating from college, two students chose our company as an employer, joining an already familiar team, which is important for the soft landing of former students at their first place of work.

In addition, for preparation and development of managers and specialists our company works closely with MPEI under a cooperation agreement. In order to effectively address current and future tasks, the project of creating the Izolyator Auditorium at MPEI is being implemented, students of MPEI undergo industrial and pre-diploma practice in our company.

In 2018, we arranged graduate examination tests of bachelor degree for nine students of MPEI. After graduation,



The main objective of the talent pool is to ensure high-quality continuous multi-level training of highly advanced personnel for the company.

two graduates are hired to work in a special design and technology bureau on part-time basis and continue to study at the Moscow Power Engineering Institute in the magistracy.

Development program of the talent pool of the company was highly appreciated by the management and the entire team of the company.

Implementation of the talent pool project allowed us to convey traditions and experience that had been formed over the course of more than a century-long development of our company.

Today we are focused on continuous training and staff development, both in specialized educational institutions and within the company.

Qualification tests for managers and specialists of the enterprise are regularly carried out, also we do our best to ensure the most effective application of the competencies of the personnel of our company talent pool.

A professional and friendly team of like-minded people who are loyal to the common mission and share common human and corporate values - this is the atmosphere that we manage to preserve and improve.

«Efficient Manager» Certificates

▼ Izolyator's CFO Tatiana Savinova is among the top students



▲ Pavel Kiryukhin, Deputy Chief Designer demonstrated great knowledge of the subject

► Izolyator staff members - listeners of «Efficient Manager» training program



▼ Certificate being awarded to the Head of IT Dpt Svetlana Georgievskaya



▼ Certificate is awarded to the Commercial Director - 1st Deputy General Director Ivan Panfilov



Happy Anniversary!



Participants of the anniversary celebration of Boris Pavlovich Kokurkin

Congratulation of the Chief Designer of Izolyator plant serving till 2009 Boris Pavlovich Kokurkin who turned 80 years old on 16 March, we held at Izolyator.

Boris Pavlovich's name is associated with many unique designs developed by the special design bureau of Izolyator. It means both improvement of oil-

in-paper insulation, creation of bushings for ultra-high-voltage classes for the largest energy project of the country, development and production of DC high-voltage bushings, gradual transition of bushings to the solid internal insulation and many other activities.

The hero of the day received congratulations at the conference hall of Izolyator, where he heard a lot of warm words and sincere wishes.

Research and development Director of Izolyator Konstantin Sipilkin thanked Boris Pavlovich for the series of brilliant designers that he trained, who maintain the highest level of advanced designs and global leadership of the company in implementation of modern technologies in power industry.

Leading specialist on porcelain at Izolyator until 2018 Ekaterina Kupkina addressed warm congratulations to Mr Kokurkin. She thanked him for the years of fruitful work wishing many years to come because just as many colleagues she finds himself her mentor in profession.

General Director of Izolyator Plant Ltd Alexander Slavinsky heartily congratulated Boris Pavlovich on behalf of the whole team of the company, marking his invaluable input in Izolyator development as well as domestic design school and creation of reliable and modern high-voltage equipment.

In his speech, Mr Kokurkin thanked the staff for an invitation, care for the company veterans and the company traditions. Boris Pavlovich stressed that there is always enthusiasm and commitment to the cause in the core of success. Besides, he paid a visit to the shops of the plant and learned about all the transformations in the company that took place over the recent years. ■



Alexander Slavinsky is congratulating the hero of the day

Welcome!



Izolyator reception area

The work was carried out according to the plan of reconstruction and redesign of the production complex, the administrative building and the adjacent territory of Izolyator. Modern convenient navigation, stands with news and technical information, Izolyator logos in workshops and photo panels with history of the plant have breathed new energy into the production and corporate life of the enterprise.

Izolyator company continuously improves the work environment and space that motivates employees to new achievements, creates all the conditions for fruitful activity. ■

Reconstruction of the entrance group of Izolyator has been completed. The works were performed taking into account all functional, ergonomic and environmental requirements, including branding of the entrance group.

At the special stands near reception area, employees and guests of the company have the opportunity to get acquainted with relevant corporate information and the latest issues of Izolyator. Presence of the company's logo sets up partners to a business mood from the very entrance.



Information corner of Izolyator reception area

Environment friendly

This year, starting from the first working days of January, Izolyator introduced a system for collecting office paper waste for their subsequent transfer to recycling enterprises.

The system was implemented in accordance with the Order of the Government of the Russian Federation dated July 25, 2017 No. 1589-p, which, for the sake of respect for the environment and natural resources,

prohibits the disposal of production and consumption waste containing useful components.

Continuous and growing concern for the preservation of the environment is an absolute priority in the activities of Izolyator, and separate waste collection represents the next stage of development in this direction. ■



Waste bins for collection of office waste paper at Izolyator

Infostand



Infostand for opinion surveys in Izolyator

In the dining room of the company, an information kiosk is installed. Company employees can leave their comments and suggestions on the most pressing issues of the company.

The first opinion survey is dedicated to the work of the dining room. We invite employees to evaluate the quality of food and service in our canteen. ■

52 | Famous Russian rock-musicians visit Izolyator



▲ Test center excursion

▼ Garik Sukachev visits Izolyator museum



▲ An autograph with best wishes to the Izolyator team





◀ Garik Sukachev and musicians of 25/17 band - Andrey Bledniy and Ant

▶ Union of Physicists and Lyricists



◀ Interview comes now. New clip is coming really soon

54 | Roll in... Camera... Action... - shooting of Garik Sukachov's video at Izolyator plant

◀ In the frame - the legend of Russian rock Garik Sukachev



▶ Attention to every detail of the future video



◀ Solo-revelation



◀ Young actors' first steps

▶ In search of the perfect mise-en-scene



◀ Let there be light - one of the coolest images of the composition

OUR PARTNERS

We appreciate all our partners



Inter RAO Group is a diversified energy holding, managing assets in Russia and European and CIS countries. The group's activities include production of electric and thermal power, wholesales of energy, international trading, engineering, export of power equipment, management of distribution networks outside Russia.



«Alageum Electric» is the largest electrical holding company in Kazakhstan, which includes more than 30 large enterprises and factories, successfully operating in the electric energy sector, electrical engineering and construction. The products of Alageum Electric meet Kazakhstan's and international quality standards and are exported to the CIS and Middle East countries.



Balikesir Elektromekanik Sanayi Tesisleri A. S. (BEST) is a manufacturer of high-quality and reliable distribution and power transformers. BEST is the largest national manufacturer in Turkey, which enjoys reputation of a reliable supplier to more than 50 countries.



Bushing HV Electric Co., Ltd. (BHHV) is a Chinese power equipment trading company. The joint activities of BHHV and Izolyator are carried out on the basis of the strategic cooperation agreement, signed on 28 September 2017.



CG Power and Industrial Solutions Limited (CG), earlier known as Crompton Greaves Limited, has received its new name on 27 February 2017. CG is an engineering conglomerate with a 2 bln USD turnover and a wide range of products, solutions and services for the power industry. It is a part of Avantha Group.



International Council on Large Electric Systems (Conseil International des Grands Réseaux Électriques – CIGRE) is the largest international non-profit Association in power industry. It is one of the most authoritative and significant international scientific and technical associations.



Founded in 1964, EMCO Limited is one of India's leading products and solutions providers up to 765 kV/ ± 800 kV for power generation, transmission, distribution utilities and industry. The products and technical solutions of EMCO Limited meet requirements of national and international standards IS, IEC, ANSI and are sold in more than 50 countries of the world.



The state power company of Vietnam EVN National Power Transmission Corporation (EVN NPT) was founded in 2008 as result of reorganization of activities of four transmission companies: Power Transmission Company No. 1, 2, 3, 4 and three power project management offices – Northern, Central and Southern.



GE T&D India Ltd makes equipment for power transmission on large distances, such as: switchgear for substations with air or SF6 insulation, circuit breakers, power transformers and measuring transformers.



IMP Powers Ltd., a flagship company of the \$120 Million IMP-Mangalam group, is a name to be reckoned with in the manufacturing of transformers and reactors up 315 MVA and up to 400 kV. This is one of the leading transformer companies of India in the equipment segment 132/220 kV with a park of over 35 000 transformers all over the world.



KME Germany GnbH & Co. KG is a European industrial concern that makes and sells semis and finished products from brass and brass alloys with leading position in the world. KME is a global company with a developed network of representations on five continents.



Kolektor Etra d.o.o. is a manufacturer of power transformers and generators up to 500 MVA and up to 420 kV. The plant has a modern laboratory to test transformers, equipped with sensitive measurement instrumentation, allowing for making accurate measurements and provide reliable results.



Mehru Electrical & Mechanical Engineers (P) Ltd. makes measuring transformers up to 420 kV. The company is a leading supplier of measuring transformers for numerous customers both inside India and the rest of the world: the products of the company are exported to 30 countries.



Maschinenfabrik Reinhausen GmbH (MR) is a leading company within the Reinhausen Group. For 30 years, MR has designed and manufactured insulation tubes from glassfiber reinforced epoxy resin. Since 2009, these insulators are made by Reinhausen Power composites GmbH, a 100% subsidiary of MR.



Power Grid Corporation of India Limited (PowerGrid) is an India-based state power grid operator engaged in construction, operation and maintenance of inter-state transmission system. This is one of the largest companies for electric power transmission in the world. The company is largely specialized in construction and operation of electric networks in India.



TBEA Co., Ltd., based on the advanced experience of power facilities construction in China, offers ecological, intellectual, reliable and highly efficient power equipment in more than 70 countries and regions of the world.



The Transmission Corporation of Telangana Limited (TSTRANSCO) was founded in the result of India's power industry reform. In 2014, APTRANSCO was divided into regional grid companies TSTRANSCO and APTRANSCO.



Toshiba Transmission & Distribution Systems (India) Pvt. Ltd. (TTDI) is a transformer manufacturer since establishment in 2013. Toshiba Transmission & Distribution Systems group of companies is a global leader in delivery of integrated solutions for transmission and distribution of electric power.



VUJE a.s. is an engineering company, which is engaged in project, contractor, sales, research and training activities mainly in nuclear and traditional power industry. All the projects are done for the customers on turn-key basis, i.e. a project is fulfilled from design documentation to completing complex testing.



Wacker Chemie AG is multinational chemical company, headquartered in Munich, Germany. Its division Wacker Silicones is among the world's biggest manufacturers of silanes through silicones. Wacker Silicones supplies components of organosilicon compound to Izolyator for high-voltage bushings' polymer external insulation making.



ZREW Transformatory is based in Lodz, Poland. The company has worked on the market of transformers for over 60 years. It manufactures, maintains, modernizes and runs diagnostics of oil power transformers.



The state production association of electric energy Belenergo (SPA Belenergo) organizes secure, reliable, economically efficient operation and innovative development of production, distribution and sales of electric and thermal energy.



VNIIR Hydroelectroautomation JSC offers its customers a complete services range in design, configuration, supply, installation, commissioning and putting into operation of power facilities. The enterprise operates as a full cycle engineering company.



JSC Georgian State Electrosystem (GSE) is a power grid system operator, rendering services in electric power transmission and exclusive dispatch services all over the country. It also controls the power lines of interstate transmission, which connect the country with its neighbours: Russia, Turkey, Armenia and Azerbaijan.



ATEF Group is specialized in the manufacture of high-quality electrical equipment and turnkey services of substation installation for industrial, utility, transportation and energy sector customers. The technologies that ATEF Group created are exported to 35 countries of the world.



SverdlovElectro Group (SVEL Group) is a leading power equipment manufacturer in Russia. The company boasts one of the impressive growth modernization rates in the industry. Cooperation of SVEL Group with the key Russian companies allows for an efficient contribution to the Government program of import substitution.



State Unitary Enterprise GC Dniestrenergo (SUE GC Dniestrenergo) services 35–330 kV substations and power lines and effects the central dispatch control function over the energy system of Transdniestr Moldavian Republic.



Zaporozhtransformator (ZTR) is the largest in CIS and Europe company to manufacture oil power transformers and electric reactors with production capacity 60 thnd MVA per year, concentrated on a single manufacturing site. ZTR trademark is well-known for an exceptional operational reliability of equipment.



The state unitary enterprise of the Republic of Crimea Krymenergo (SUEP RC Krymenergo) is the largest power company of the Crimea that was created to ensure stability of the power grid operation and energy security in the region. The service area of SUE RC Krymenergo is the whole territory of the Crimean peninsula.



National Power Grid of Kyrgyzstan (NGP Kyrgyzstan) is an energy company, which transport electric power, produced by power plants via high-voltage power lines across the entire Kyrgyzstan to distribution companies and large industrial consumers.



The Public listed company Rossiiskie Seti (Rosseti PJSC) is a power networks operator in Russia, one of the biggest power grids in the world. The company manages 2.3 mln km of power networks, 490 thnd substations with transformer capacity exceeding 761 GVA.



The Public Listed Company Federal Hydrogenerating Company – RusHydro Group – is one of the largest Russian energy holdings. RusHydro is a leader in electric power production from renewable sources of energy, which develops generation on the basis of energy of water streams, sea tides, wind and geothermal energy.



Unipro PJSC (E.ON Russia JSC until June 2016) is the most efficient company of the thermal power generation sector in the Russian Federation. Unipro PJSC consists of five heat power plants. Company's core operations comprise electric power and capacity generation and sales.



Sverdlovsk branch of T Plus Group comprises generating and thermal assets in seven cities of Sverdlovsk region. There are six power plans (TPS, SDPP, HPP) within its structure and in operational control - Ekaterinburg heat supply company, Sverdlovsk heat supply company and Engineering and technical center of Sverdlovsk region.



Power Machines – Toshiba. High-voltage transformers Ltd is a joint venture of Power Machines JSC and Toshiba Corporation. The key product of the plant are power transformers and autotransformers in 110–750 kV range with capacity exceeding 25 MVA, including three-phase execution.



SuperOx was established in 2006 by investor Andrey Vavilov for development of production technology of high-temperature superconductive second generation wires. The company has manufacturing branches in Russia and Japan.



Surgut SDPP-2 supplies electric power to the regions of West Siberia and Ural and is the largest producer of electricity in Russia and third by capacity thermal power plant in the world: total installed capacity of the power plant is 5657.1 MW. It is a branch of Unipro generating company.



Togliatti Transformer Limited is one of the largest designers and makers of electric engineering equipment in Russia and the CIS countries. As of today, the company's main business is highvoltage power transformers production.



JSC «Uralelectrotyazhmash» (UETM) is the biggest Russian developer and producer of electric power equipment for generation, transmission, distribution and consumption of energy. The company makes over 2000 items of products for 3000 customers in Russia and abroad.



Fortum JSC is a leading producer of thermal and electric energy in Ural and West Siberia. The company structure includes eight TPPs. Fortum is a part of Russia division of the Finnish state energy company Fortum corporation.



The Public listed company Federal Grid Company of the Unified energy system (FGC UES PJSC) is one of the largest public power grid companies in the world, tasked with operation and development of the Unified national (all-Russian) electric network. The company is listed as a systemic company in Russia.



Chirchiq Transformer Plant JSC was founded in 1942 and for over 70 years now, has worked in machinebuilding of Uzbekistan, producing transformers and packaged transformer substations. Today, it is a leading company of electrical engineering in the Republic of Uzbekistan.



Open Joint Stock Holding Company «Electrozavod» (OJSHC Elektrozaovod) is the leading Russian and world-wide manufacturer of various transformer equipment being supplied for all industries including electric-power industry, metallurgy, machine building, transport, oil and gas complex, housing and utilities infrastructure.



Electroshield Samara is an advanced technology industrial company, boasting 70 years of history, and the largest domestic manufacturer 0,4–220 kV distribution equipment. This is one of the leading engineering companies comprising two design institutes, construction company, several manufacturing sites in Russia and the CIS and a well-developed regional offices network.



Energy Standard Ltd is a dynamically developing company that promotes products of the largest CIS plants on the Russian market, including products of Zaporozhtransformator. The company offers a wide range of equipment for oil, gas, chemical, ferrous and nonferrous metallurgy, rail transport and mining industries.

We appreciate our partners for any information about our companies' joint activities, which we will gladly print on the pages of the next issue of our corporate edition. We look forward to your news on this email address: n.borichev@mosizolyator.ru

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