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

IZOLYATOR

Company established in 1896

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MIM

Massa Izolyator Mehru

Integration energy

launch of Russian-Indian enterprise

CONTENTS

IZOLYATOR

Corporate Edition
Izolyator
Quarterly

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For more than 123 years of Izolyator history, we have derived for ourselves the concept of the sustainable development of our company. It rests on three pillars: the first is the product range; the second is the balance of supplies to the domestic and foreign markets; the third is the production of equipment and components for new transformers and spare parts for old-type transformers.

In 2019, we managed to stabilize our presence in the domestic Russian market and even develop it. We are re-establishing contacts with our long-time partners in Russia and the CIS countries. New designs of bushings with solid RIN-insulation were developed – they are already installed at various power facilities and, I hope, they will serve well. In the nearest future we'll be able to certify products at PJSC ROSSETI and offer them to all our customers.

One of the key tasks of our company was to withdraw from the production of monoproducts. The first step in this direction has been made: the difficult initial stage has been passed, and already this year we created a new enterprise, Izolyator – AKS, for the production of cable armature. At present, this new company staff has been formed, consisting of specialists who have successful experience in organizing the production of cable fittings.

Getting on Track and Moving Forward!

Dr. Alexander SLAVINSKY,

Chief Executive Officer of

Zavod 'Izolyator' LLC,

Head of CIGRE National

Study Committee D1

For a long time foreign manufacturers fully dominated on the Russian market of high-voltage cable accessories. Since 2010 a number of domestic firms attempted to create their own localized production. However, due to lack of knowledge of the features of production technology, shortage of qualified personnel with specific experience in the production and sales of high-voltage cable armature, as well as insufficient funding, these attempts were not so successful.

By 2019, only a few managed to summarize the available experience, learn from previous mistakes and create local enterprises for the production of high-voltage cable armature for voltage classes 110 - 220 kV, while energy companies still have to order cable armature 330 kV and above from foreign suppliers.

Implementation of import substitution policy is currently being promoted at the state level, so the Ministry of Energy of the Russian Federation, in cooperation with the Ministry of Industry and Trade of the Russian Federation, as well as other related federal executive bodies and companies of the Fuel and Energy Complex (FEC) are working to reduce dependence of the Russian energy industry complex from imported equipment, technology and materials.

Thus, the domestic energy sector as a whole and the cable armature market in particular are in dire need of high-quality cable armature that meet the most stringent requirements and are produced in Russia.

In order to achieve success of this ambitious project, we are planning to introduce and market cable armature of all voltage classes from 110 to 500 kV with a full product line (transition joints, terminations, plug-in connectors).

Certainly, the project implementation will require significant investments and involve certain risks that must be taken into account, but in the long run this project will further strengthen the Izolyator's role in the modernization and sustainable development of the Russian energy sector.

In general, the balance of deliveries in Russia and abroad is one of the guarantees of the financial and economic sustainability of our company. Foreign orders provide new challenges related to changing the design of products, searching for technical solutions, non-standard approaches in execution. Many new engineering solutions of our plant appear due to foreign orders.

When solving new technical problems, new ideas and new products are born. When the customized product is finally ready, we either put it on mass production, or wait for it to be widely demanded by the market. So, thanks to the order of our Chinese partners, we launched a serial production line of DC inputs for long-distance transmission lines. We are fully aware that the replacement of our products will be needed after decades of service. But, having realized this

order, we have created complete documentation on the production of high-voltage direct-current bushings. And if in Russia they ever begin to build long-distance transmission lines, bushings production is ready to be launched anytime.

Over the past few years, as part of the development of cooperation, a number of business meetings have been held both between Russian and Indian power engineers, and between industrial enterprises producing high-voltage equipment in India and Russia. Also in India, our company organized a number of open technical conferences in the field of electric power industry to enhance interstate cooperation.

One of the most significant results of these meetings and conferences was that vast experience of leading Russian manufacturers of electrical products is considered to play significant role for the modernization of the electric power complex in India, as this experience is based on many years of successful relationship with the Federal Grid Company of Russia, with its largest transmission lines in the world and high-voltage equipment operating in different climatic conditions.

The CIGRE cooperation opens up new opportunities for cooperation in the electric power industry and the production of electrical equipment for power grid companies in Russia and India, and also promotes the development of scientific and technical exchange between specialists from the two countries.

The main task of CIGRE is research, the search of something new. When our specialists participate in CIGRE working groups, analyze what is in the world, participate in the creation of new methods, they get the most valuable thing - new knowledge. They see how their colleagues from other countries work, discuss relevant issues of energy and electrical engineering with them, and grow professionally. CIGRE provides an opportunity to assess the level of world energy development at this stage, and this is incredibly important for our enterprise!

Continuing to develop our presence in the Asian market, Izolyator, in the framework of the 47th Session of CIGRE in Paris in 2018, signed a memorandum of cooperation with the Indian company Mehru on the organization of a joint venture producing high-voltage bushings with modern RIP-insulation in India. The signing ceremony of the Agreement was held at the booth of the CIGRE Russian National Committee in the presence of Andrei Murov, Chairman of the Management Board of PJSC FGC UES, RNC CIGRE Chairman, and Indu Shekhar Jha, Chairman of Power Grid Corporation of India Limited and Indian NC CIGRE.

Creation of an industrial complex in India will ensure the satisfaction of the growing needs of the Asian market for high-voltage RIP bushings

Creation of an industrial complex in India based on the Izolyator technologies will ensure the satisfaction of the growing needs of the Asian market for our high-tech products, as well as significantly reduce our products lead time to Indian power facilities.

The key goal that we achieve by developing the joint venture of the Izolyator plant and the Indian company Mehru is penetration of our most progressive technologies not only into the Indian market, but also into Southeast Asia. At the same time I want to note that we are talking not only about the production of high-voltage bushings, but also the export of technologies. Fortunately, today there are enough enterprises in Russia with really high-tech equipment and we are eager to cooperate in this area. I urge all colleagues interested in promoting their products in the Indian region to share their experiences. On our part, we are ready to promote, share contacts, discuss our achievements and difficulties that we have experienced over the past years. We will sincerely welcome the success of our colleagues.

Izolyator is making yet another breakthrough, so to speak. But at the same time, we are evolving in an extremely important and necessary direction, and I am sure that we will succeed. We are fully committed to our plans achievement, as well as understand our full responsibility - when you are the first, everyone follows you as a leader and at the same time notices even the smallest mistakes. However, mistakes and difficulties are only an integral part of any big business.

«Power grids are the infrastructure that is fundamental for the growth and modernization of the economy, they should be open to modern technological innovations and meet the needs of consumers.

Alexander Novak
Minister of Energy of the Russian Federation

Russia-India: Course Towards Cooperation

Prime Minister of India Narendra Modi and President of the Russian Federation Vladimir Putin on a summit of the Shanghai Cooperation Organization in Kyrgyzstan

Within the framework of SCO summit in Bishkek (Kyrgyzstan) Vladimir Putin held talks with the Prime Minister of India Narendra Modi.

At the beginning of negotiations Vladimir Putin re-congratulated Narendra Modi on the victory of the party and his re-election as a Prime Minister of India. Putin noted that relation between India and Russia developed progressively, «as well owing to your personal efforts.»

«I want to express the hope that after your re-election our work on the development of bilateral contacts, contacts for the benefit of the people of India and people of the Russian Federation, will be continued», he said.

In turn, the Indian Prime Minister said that Putin had predicted his victory in a sense. «You congratulated me even before the final results were summed up. I want to sincerely thank you for the trust.», he said. He aslo said that together Russia and India can do a lot and do it in a short time. «We have created and atmosphere of friendship», he said. ■

Experts from all over the world discussed current issues of digital transformation of distribution networks during CIRED forum

CIRED - the leading electricity distribution international forum is held once every other year. After Torino in 2005, Vienna in 2007, Prague in 2009, Frankfurt am Main in 2011 and Stockholm in 2013 and 2015, electricity distribution international conference has brought together professionals and industry leaders from all over the world in Lyon, and in Scotland in 2017.

The 2019 event took place in Madrid, located in the heart of Spain, on June 3-6, 2019.

On all discussion platforms of the 25th CIRED Conference, for three days, more than 1,500 technical experts from 60 countries of the world discussed common problems of building modern intelligent electrical distribution networks. A busy business program covered about 50 reports per day in the framework of main sessions, 8 roundtable discussions and two poster sessions each of them presented more than 130 works illustrating the results of scientific research and engineering research and development.

CIRED 2019 in Spain

Sharing of best practices allowed experts to find the most optimal solutions for the salvation of overarching world challenges on the formation of an affordable and reliable power grid infrastructure, which effective operation is a key point for human well-being and stable world economies. ■

Total electricity consumption in Russia in 2018 was **1076,2** billion kWh, **1,6%** higher than 2017 result

All-Russian meeting of chief engineers in Power Industry

Alexander Slavinsky (right) at the All-Russian meeting of chief engineers in Power Industry in Sochi

In April 2019 in Sochi under the patronage of the Ministry of Energy of the Russian Federation took place IX All-Russian meeting of chief engineers in Power Industry (SGIE-2019), dedicated to the most pressing issues of the domestic electric power industry and prospects for its development.

The event was attended by over 250 participants from all over the country: chief engineers and technical managers of electric power companies, representatives of the Ministry of Energy of Russia, Rostechnadzor, telecommunications and IT companies, leading experts of research centers.

The Deputy Minister of Energy of the Russian Federation, Andrei Cherezov, opened the work of SGIE-2019 and voiced the main tasks and prospects for digital transformation in the energy sector. "The main goal of digitalization is the introduction of intelligent process control systems to provide economic effects by changing business models and management approaches," said the Deputy Minister. ■

Power industry development as key to mutual success

On 5 and 6 June 2019 in Moscow, Izolyator took part in the XXIX conference of the International Association TRAVEK dedicated to the topic of "The Current State and Prospects for the Development of the Electric Power Industry and High-Voltage Electrical Equipment. Transformers. Switching devices. Converters. Management systems and diagnostics".

The conference was held with the support of the State Duma of the Federal Assembly of the Russian Federation (State Duma), the Academy of Electrotechnical Sciences of the Russian Federation, the Ministry of Industry and Trade of the Russian Federation (Minpromtorg), PJSC ROSSETI and the Federal Grid Company of the Unified Energy System (FGC UES).

The conference was attended by managers and technical specialists of companies — consumers of high-voltage electrical equipment, representatives of enterprises manufacturing electrical equipment both in Russia and overseas, leading scientists, developers, representatives of research and design organizations, universities.

Izolyator was represented at the conference by Dr. Alexander Slavinsky, Vice President of the TRAVEK International Association, Chief Executive Officer of Zavod 'Izolyator' LLC, Head of CIGRE National Study Committee D1 and Dmitry Lopatin, Technical Director of Izolyator-AKS LLC, who made a presentation on aspects of the organization of modern production of cable fittings in Russia, dedicated to the new product line of the Izolyator plant.

A number of business meetings on the sidelines of the conference were held by Maxim Zagrebin, head of OEM sales at Izolyator.

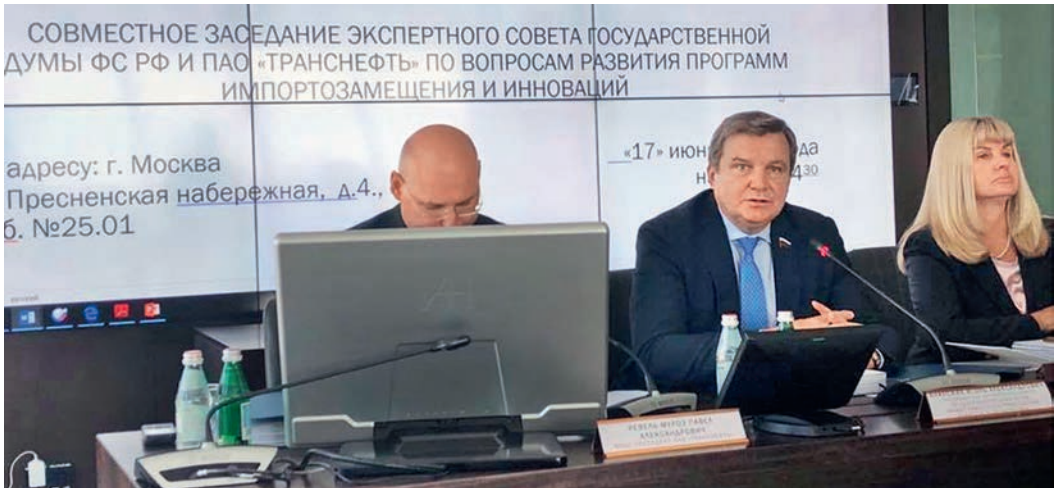
Following the results of the work, the conference participants signed a decision memorandum reflecting the achievements outlined in the reports. ■

XXIX Conference of TRAVEK International Association

8 | Industry Events in Pictures

◀ Saint Petersburg International Economic Forum 2019

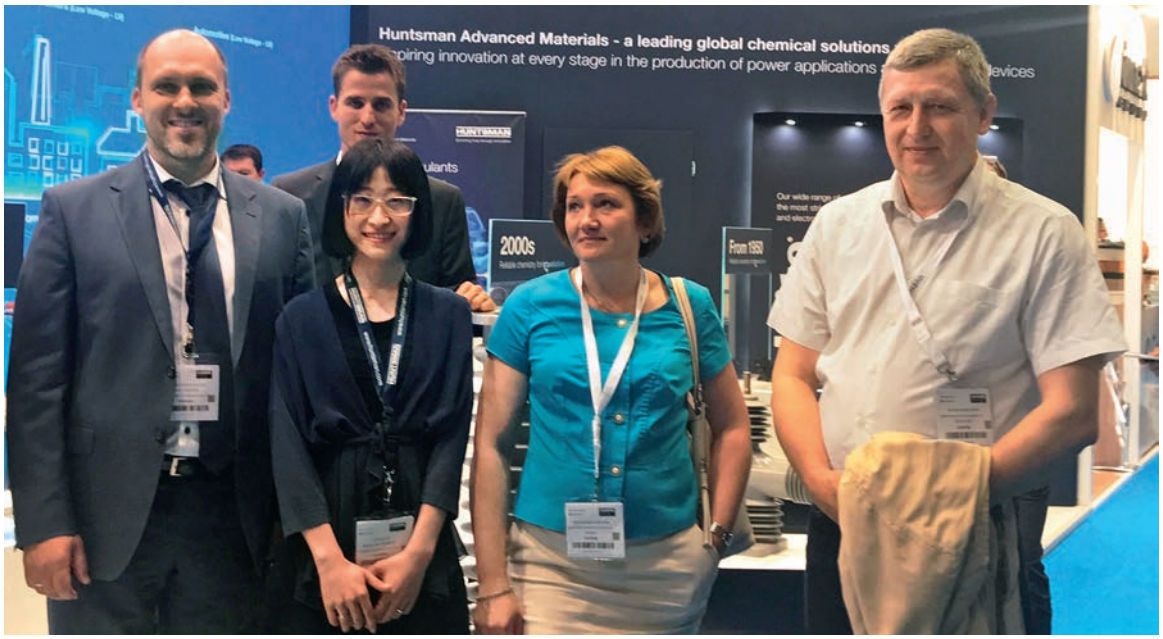
▶ Meeting of the Energy efficiency and saving development and integration commission of the Russian Engineering Union. The meeting is chaired by the chairman of the Energy efficiency and saving development and integration commission of the Russian Engineering Union, Chairman of the Management Board of FGC UES, Andrey Murov (center)



◀ First Deputy Chairman of the State Duma Committee on Energy Igor Ananskykh (center) and his assistant, executive secretary of the Energy Section and Development of the Import Substitution Programs Section of the Expert Council of A Just Russia political party in the State Duma Marina Mironova in the Presidium of meeting at Transneft

◀ Alexander Slavinsky reports at the Fault-free Transformer 6.0 seminar in Nizhny Novgorod

▶ Conference at the St. Petersburg Energy Institute of Advanced Training, on the left in the foreground - Alexander Slavinsky



◀ Konstantin Sipilkin (right) and Svetlana Kryuchkova (second to the right) at the booth of the partner company — Huntsman Corporation at CWIEME Berlin 2019

Reported on conference results

Izolyator took part in the Reporting Conference on the results of the 47th CIGRE Session, held in August 2018 in Paris.

Participants of the Reporting Conference on the 47th Session of CIGRE

Participants involved

The conference, organized by the CIGRE Russian National Committee, was held at research and development center at Federal Grid Company of Unified Energy System, Joint Stock Company (R&D CENTER FGC UES, JSC).

The event was attended by major domestic consumers and manufacturers of electrical equipment, representatives of industry legislative and regulatory structures, heads of the RNC CIGRE and its national research committees, leading experts from research and development organizations and specialists of energy companies.

Welcoming word to the audience was addressed by Andrei Murov, Chairman of the Management Board of FGC UES, who also heads the RNC CIGRE. He summarized the results of the participation of the Russian delegation at the 47th CIGRE Session in Paris, and also spoke about the events that will take place in Russia within the framework of CIGRE. Mr. Murov noted that the popularization of the results of scientific and technical cooperation, the access of Russian specialists to international expertise is an important task and the advantage of participating in the work of the RNC CIGRE.

Topical reports

The main report of the plenary part of the conference highlighted the current challenges for the largest energy systems in the 3D era (based on CIGRE and GO15).

Representatives of national research committees presented an overview of the main world cases of implementing end-to-end digital transformation technologies.

The second part of the conference was devoted to reporting presentations on the results of the 47th CIGRE Session. Representatives of Russia from various research committees discussed global trends in the development of equipment and technologies in the electric power industry, as well as issues relevant for Russia and areas of work, taking into account international experience.

Report «The main directions of monitoring, diagnostics and testing of electrical equipment on the basis of the 47th Session of CIGRE of the Study Committee D1» was presented by Dr. Alexander Slavinsky, CIGRE Study Committee D1 Regular Member, Chief Executive Officer of Zavod 'Izolyator' LLC.

In the report, Alexander Slavinsky presented information on the activities of the working groups of the CIGRE Study Committee D1 (CIGRE SC D1); review of CIGRE SC D1 international working groups open for participation; overview of the main trends in the development and application of HVDC insulation systems; review on the issues of ecology, reliability, diagnostics and testing of electrical equipment on the basis of the 47th CIGRE Session.

The report also presented an overview of the priority themes of the 48th CIGRE Session on SC D1, which will be held in Paris from 23 to 28 August 2020.

Head of Department of World Electric Power Industry of MGIMO, member of the Management Board Bureau of the Russian Engineering Union Nikolay Shvets and Alexander Slavinsky at the Izolyator stand at the technical exhibition of the Reporting Conference on the 47th Session of CIGRE

First-hand experience

The National Study Committee D1 RNC CIGRE and Izolyator took part in the exhibition exposition of the RNC CIGRE Reporting Conference and presented models of innovative products of Izolyator plant:

- capacitor type 110 kV high-voltage bushing with internal RIN- and polymeric external insulation,
- stress cone of connecting sleeves MK-SPSE-64/110 with direct shields connection for 110 kV power cables with plastic insulation or MK-SRE-64/110 with separated shields for 110 kV power cables with plastic insulation,
- stress-cone of the end sleeve MKKNU-64/110 for 110 kV power cables with plastic insulation.

Following the conference, an expert opinion and position will be formed that will determine the future directions of work of the national research committees of the RNC CIGRE. Such position will be used as informational background for Russian representatives preparing for the 48th CIGRE Session, which will be held from August 23-28, 2020 in Paris.

We appreciate the Russian National Committee of CIGRE and the Research and Development Center of FGC UES for organizing the conference at the highest level! ■

«Activization of exchanges in applied science topics helps to increase export potential of the industry, make an adequate assessment of demand and areas of design development.

Andrey Murov
RNC CIGRE Chairman, Chairman of the Management Board of at FGC UES PJSC

On the best achievements and new standards

Participants of CIGRE WG D1.70 session on the topic "Functionality of modern insulating liquids for transformers and similar equipment" that took place in Slovenia

On 26 April 2019, a session of CIGRE WG D1.70 on the topic "Functionality of modern insulating liquids for transformers and similar equipment" was held in Slovenia.

34 specialists from 15 countries, working in production and operation of power equipment and dielectric liquids, lab research and R&D took part in the meeting of the workgroup.

The Russian National Committee of International Council on Large Electric Systems (RNC CIGRE) was represented by Maxim Bobryshev, Project Manager — Engineer at Department of material supplies at ElecTrade-M Ltd, member of the CIGRE National Study Committee D1 (CIGRE NSC D1). CIGRE NSC D1 base organization Massa Ltd (Izolyator) sponsored the visit.

The sitting of the international workgroup was held as a conference with presentation of materials and subsequent discussion.

The audience were presented the results of the previous researches of properties and features of modern dielectric liquids. Later, the experts discussed testing methods, criteria for results evaluation, necessity and sufficiency of some of those criteria. Besides, they discussed modern standards of lab testing and necessity to make any amendments. The next meeting of the international workgroup is scheduled in the end of 2019. ■

Real-Time Action

On April 18, 2019, a meeting of the National Study Committee D1 "Materials and Emerging Test Techniques" of the Russian National Committee CIGRE was held at Izolyator. During videoconference participants discussed current issues and plans, as well as summed up the work of the members of the NSC D1 RNC CIGRE.

Meeting of the NSC D1 RNC CIGRE at Izolyator

The chairman of the meeting is the CIGRE Study Committee D1 Regular Member, Chief Executive Officer of Zavod 'Izolyator' LLC, Dr. Alexander Slavinsky. During the meeting Izolyator was also represented by Deputy Quality Director at Izolyator, Coordinator of CIGRE Russian Study Committee D1 Vladimir Ustinov; Galina Ustinova, engineer of the Moscow branch of Izolyator and a number of invited employees. ■

Platform for comprehensive discussions

On 4–6 June 2019, Izolyator took part in the 22nd All-Russian Conference 'Increasing reliability, efficiency and safety of power equipment engineering'

Krasnodar region Association 'Regional Scientific and Technical Union of Power Engineers and Technicians' (KRA RSTUPET) came as organizer of this annual event.

The conference traditionally went with technical support and a strong engagement of Kubanenergo PJSC, largest power grid company on the territory of the Krasnodar region and the Republic of Adygeya. ■

Participants of the 22nd All-Russian Conference 'Increasing reliability, efficiency and safety of power equipment engineering', Gelendzhik (photo by KRA RSTUPET)

Integration energy: Launch of Russian-Indian enterprise Massa-Izolyator-Mehru (MIM)

Izolyator International Technical Conference in Bangalore, India

Integration processes in the global power industry today allow building close cooperation in the scientific and technical field, promote the introduction of new technologies of electrical equipment production, and contribute to ensuring innovative development and reliable operation of national power grids

Utilizing more than 120 years of successful experience in the production of high-voltage bushings, our company openly demonstrates the technical advantages of Izolyator products to all partners. On the basis of the Indian Central Power Research Institute (CPRI) — the generally recognized world leader in electrical and specialized testing of electric power products, Izolyator arranged a full range of standard tests of high-voltage bushings for high and ultra-high voltage classes. Also in Bangalore in India, the company held an International Technical Conference on Russian-Indian cooperation in the development of the electric power industry. In order to confirm our transparency and readiness for the dialogue, consumers of high-voltage equipment were invited to participate in these events — power grid and industrial companies from Europe, Russia, Asia and the Middle East.

Within the framework of the main part of the conference, Russian and Indian producers of operating power equipment shared their experience, as well as discussed aspects and technical

Ivan Panfilov presents Russian-Indian joint venture for production of high-voltage bushings with RIP-insulation in India

Sandeep Prakash Sharma, Executive Director of Mehru, continues the presentation of a new joint venture

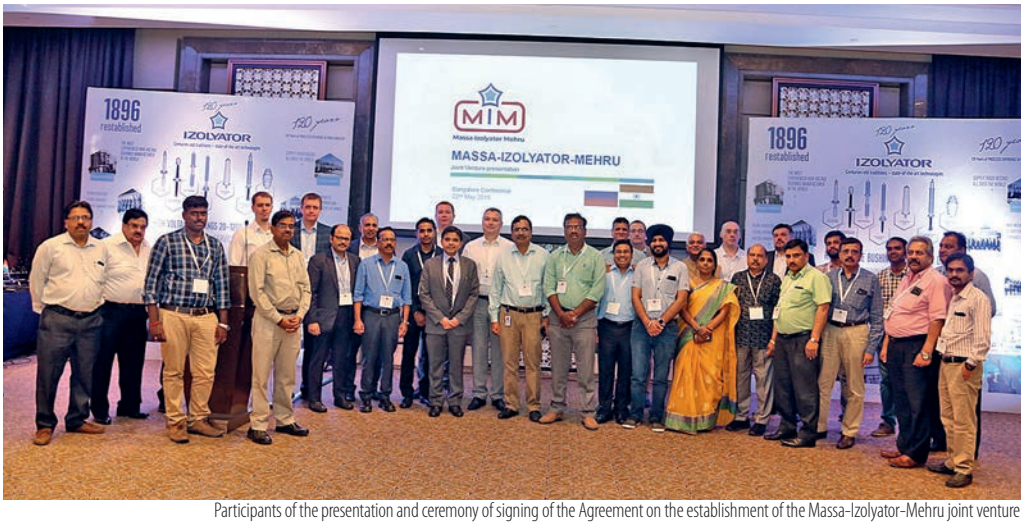
Conference audience witnessed the birth of a new Russian-Indian high-tech joint venture

features of operation, installation and maintenance of Izolyator ultrahigh voltage bushings with RIP insulation.

The standard test program at the Central Power Research Institute (CPRI) included a full cycle of high-voltage, current and special seismic tests of high-voltage bushings for high and ultra-high voltage classes.

During a visit to the Central Power Research Institute representatives of Izolyator, PowerGrid, and Mehru Electrical & Mechanical Engineers (P) Ltd. (Mehru) took part in a meeting with top-management of the Institute, which is headed by Director General V.S.Nandakumar

In the second part of the conference, Russian company Izolyator and Indian Mehru presented a joint venture (JV) that was created to launch production of high-voltage bushings with solid internal RIP insulation in India. The Memorandum on the establishment of the joint venture was signed during the 47th CIGRE Session in Paris.



Participants of the presentation and ceremony of signing of the Agreement on the establishment of the Massa-Izolyator-Mehru joint venture

Chief Executive Officer of Zavod 'Izolyator' LLC Dr. Alexander Slavinsky and Executive Director of Mehru Electrical & Mechanical Engineers (P) Ltd. Sandeep Prakash Sharma in a solemn atmosphere exchanged signed copies of the Agreement on the establishment of a joint venture for production of high-voltage bushings with solid RIP insulation in India.

The agreement on the establishment of a joint venture Massa-Izolyator-Mehru has been signed!

The agreement establishes the principles of building of the production site in India and establishing of full supply and sales chain of high-voltage bushings of various voltage classes with modern solid RIP insulation. The core part, as well as the know-how of the joint venture will be the internal RIP-insulation — a proprietary development of the Izolyator plant. It must be noted that this is the first experience of Russian enterprises in creating a joint venture for the production of high-voltage electrical power equipment with Indian companies.

The conference contributed to the all-round development of business contacts and the formation of proposals for expanding cooperation between Russian and leading world electrical companies and major energy companies.

14 | On the Sidelines of the International Conference in India

◀ Izolyator's International Technical Conference participants registration in Bangalore, India

▲ The Izolyator company management cordially welcomes the invited participants of the conference.

▼ Participants of the business meeting on the sidelines of the conference

◀ The delegation of the Indian state electric grid company Power Grid Corporation of India Limited arrived to participate in the conference

▶ The meeting of long-time business partners

▲ The conference opens up new prospects for cooperation

▼ Izolyator's International Technical Conference in India went successfully

16 | Type tests of Izolyator 420 kV bushing at State Research Institute of Power Engineering of India (CPRI)

Central Power Research Institute (CPRI) is the powerhouse of the Indian electrical industry. Set up in 1960 by the Government of India, it functions as a centre for applied research in electrical power engineering assisting the electrical industry in product development and quality assurance. CPRI also serves as an independent authority for testing and certification of power equipment.

▶ Seismic testing. Bangalore (India). Set up.

◀ Test #1, #2. Snapback Test. Applied load - 5000 N. Directions of application of force - X, Y

The following Izolyator employees took part in the tests: Deputy Chief Designer Pavel Kiryukhin, Lead Chief Engineer Vladimir Okunev, and Lead Testing Specialist Pavel Romanenko.

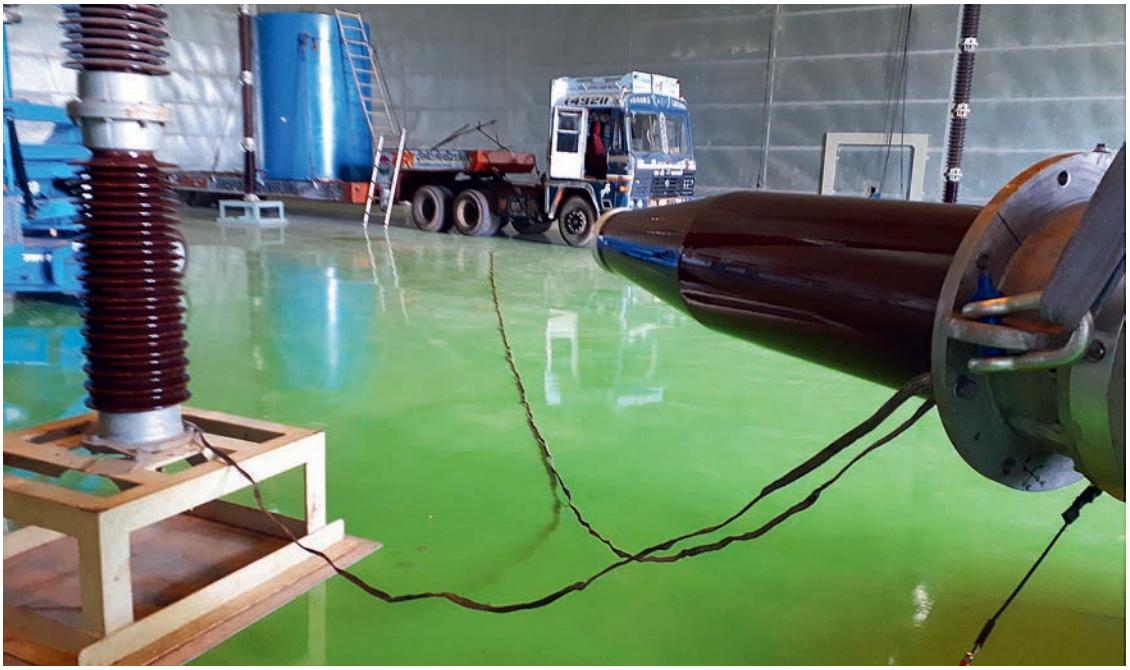
▲ Test #3 Setup
Determination of bushing resonant frequencies. Impact level - 0.1g. Sweep speed - 1 Oct. / Min. Frequency Range 0.5-35 Hz. The direction of application of the impact (alternately) - X, Y, Z

▲ Test #4 Setup
Seismic resistance test with simultaneous impact in three directions. Seismic impact is equivalent to an earthquake with an intensity on the MSK scale of 8 to 9 points. Duration of exposure 32 seconds. Frequency range from 0.3 to 33 Hz. Attenuation of 2%. Acceleration of the zero period = 0.45g

▶ Test #5.
Seismic testing.
Determination of bushing resonant frequencies. Impact level - 0.1g. Sweep speed - 1 Oct. / Min. Frequency Range 0.5-35 Hz. The direction of application of the impact (alternately) - X, Y, Z

◀ Preparation for type testing in the CPRI laboratory in Hyderabad (India)

▶ Measurements of bushing insulation



◀ Measurement of bushing parameters before impulse tests

◀ Impulse testing.
Voltage values of lightning impulses:
- full pulse of negative polarity - 1497 kV
- chopped impulse of negative polarity
- 1693 kV

▼ Measurements on insulation of the bushing at 50 Hz frequency after pulse tests.
- Testing with a one-minute test voltage of 750 kV at 50 Hz.
- Measurements on insulation of the bushing at 50 Hz frequency after application of a one-minute test voltage.

▼ All the stages of the Izolyator bushing test at the State Research Institute of Power Engineering of India CPRI were completed successfully

At the moment, we continue the series of Izolyator high-voltage bushings tests in India.

20 | Creating a New Vision and Shaping the Future Together

Dr. Alexander Slavinsky, Chief Executive Officer Zavod 'Izolyator' LLC

"I appreciate all our Indian Partners and participants for their valuable time and making this conference successful. Many thanks for the warm hospitality and active cooperation with our professionals for further strengthening of Russia-India business ties, relationship and the century long friendship between our Countries"

Mr. Vikram Singh Bhal, Sr. General Manager (Engg.) Power Grid Corporation of India Ltd.

The conference was very productive, especially the RIP bushings, their production being done by Izolyator in India, which is for the first time in India when a foreign manufacturer of bushings participates in the Government of India's flagship program. So, they have stood the test of the time. They have set up a factory with Mehru. That's a big acheivement for Izolyator when India's focus is concerned. Then, it also showed us how big a manufacturer Izolyator is. It is a 120-year old company and supplying all over Europe and the good quality of 400 kV RIP bushings that we have been familiar with and 800 kV RIP bushings that we are also familiar with. All in all, it was very informative, very productive seminar. Lets hope they will keep on doing well and show a good job done.

Mr. Amandeep Singh, Chief Manager (AM) Power Grid Corporation of India Ltd.

The conference was very learning experience for everyone. It was my first time when we interacted with the top management and technical people of Izolyator. And it was a really good experience. We learned great many things today, And technically I think definitely Izolyator is one of the best in the world. And I wish them all success in the future also. We wish for a long and very endearing experience and relationship with PowerGrid. And we wish them once again best of luck for the future. Thank you! Thanks a lot for the hospitality!

Dr. K.T. Varughese, Additional Director — I & PD — CPRI-Bangalore Central Power Research Institute-Bangalore

We have all range of facilities to test all kinds of electrical products as per international standards. I am very happy that Massa - Izolyator has offered CPRI to test their high-capacity product 800 kV at CPRI, Bangalore. Today, they have brought two important devices a 400 kV bushing and an 800 kV bushing. That equipment was tested as per international standards in our institute. This is a very good stepping stone for a good collaboration between India and Russia through Central Power Research Institute of India and Massa LLC in Russia.

Eric Jean Patric Moal
Technical expert, Business Development, Maschinenfabrik Reinhausen GmbH Branch in France

I can say that I'm really impressed by the organization of the conference. By the way it was really done professionally. And, I have to say that the conference topics, which were very well presented. And also I was impressed by the seismic tests, which were very severe for the bushing. I want again to thank you and thank Izolyator and also say that I really enjoyed the way it was done. I hope that our dear Indian customers will appreciate the work we have together between Maschinenfabrik Reinhausen and Izolyator. Thank you again.

Mr. Sanjeev Kumar,
Choudhary, Sr. DGM (Engineering-HVDC Power Grid Corporation of India Ltd.

The international conference was a success. I am very grateful to Izolyator and Mehru for making an input in the development of India together. I would wish them to consider possibility of production of high-voltage bushings on direct current. We are facing problems with 800 kV, especially on direct current, wall bushings. So, if Mehru and the joint venture with Izolyator will work on direct current bushings, it will definitely help India and our development.

Mr. Richik Manas Das,
Chief Manager (Engg.) Power Grid Corporation of India Ltd.

My impressions of the conference are only positive. We were familiarized with the activities of Izolyator on the international market and personally onserved Izolyator bushings testing at CPRI test laboratory. The tests were done in full compliance with all standards. All the activities were organized on a high level.

CPRI-Bangalore: Mr. Ramdas — Engineering Officer Grade-II

I would like to thank Izolyator for organization of the international conference and ultra-high-voltage testing of RIP bushings on the high level. This is the first such testing at CPRI laboratory and we are looking forward to continuing our cooperation in the future. I would like to thank the Izolyator team and congratulate them on the successful result of 400 kV bushings testing!

Dr. Ashok Kumar Singh

Izolyator have invited consumers of Electric Grid Companies, Manufacturers, partners from India, Russia, Europe, Asia and Middle East countries to take part in the International Conference. This Event was planned in two parts & two locations in Bengaluru, Karnataka, India.

The main part of the event was conducted at SANGRI LA-HOTEL-KRISHNA HALL, BENGALURU, KARNATAKA, INDIA that includes an open Technical Conference providing great opportunity to discuss all aspects and technical features of operation, installation and maintenance of high Voltage bushing with RIP insulation of Ultrahigh Voltage, designed and produced by Massa LLC(IZOLYATOR COMPANY) Moscow.

During the conference, attendees from State Utilities (TSTRANSCO, GETCO, APTRANSCO, TANTRANSCO) and leading manufacturers of transformer — reactor equipment of India and abroad shared their opinion, thoughts and suggestions and fully appreciated Izolyator Company move/initiative taken up for providing awareness through such an event of this scale, fully dedicated on RIP bushing Technology. It is undoubtedly recognition of the quality of the Izolyator Products in India and around the globe.

The second Part of the Event was organized in Bengaluru CPRI-EVRC-Lab, Earthquake Engineering and Vibration Research Centre Lab focused on full range of standard tests program including full cycles of electrical Current, Special Seismic test of 420kV-3000A and 800kV-2000A RIP bushings. This was a historical moment for all of us to witness together, first time in India, testing of Seismic resistance of 420kV & 800kV bushings. This was the final stage completing the main test cycle during the International event of high voltage RIP bushing at Bengaluru, Karnataka, India.

IVAN PANFILOV
Commercial Director
1st Deputy CEO

We signed a strategic agreement with 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.

In April 2019, our company and Mehru Electrical & Mechanical Engineers (P) Ltd., an Indian transformer plant for the first time widely introduced the Massa Izolyator Mehru Pvt. Ltd. (MIM) joint venture at the 6th International Exhibition and Conference GridTech 2019, which was held in New Delhi, India. Exhibition visitors had the best opportunity to get acquainted in detail with the goals, objectives and plans of the new enterprise in the Indian electrical market.

During the exhibition and conference, a number of business meetings were held with representatives of Indian companies - Izolyator and Mehru partners. Among them: the Indian state power grid company Power Grid Corporation of India Limited, regional power grid companies, generating companies and transformer plants. They discussed ongoing issues of cooperation, the progress of joint projects, common goals and prospects for joint activities.

Izolyator management paid a working visit to the Mehru Electrical & Mechanical Engineers (P) Ltd. transformer plant in Bhiwadi, Rajasthan, where a new Russian-Indian joint venture is planned to be located. Also negotiations were held with Sandeep Prakash Sharma, Executive Director of Mehru, during which parties discussed action plan of production rollout.

To confirm our openness and transparency in May of this year we arranged an international conference and a set of routine tests of high-voltage bushings with solid RIP insulation for ultrahigh voltage classes, which took place at the Central Power Research Institute (CPRI) in Bangalore and Hyderabad in India. The open technical conference provided an excellent opportunity to discuss all aspects and technical features of operation, installation and maintenance of high-voltage bushings with internal RIP-insulation for ultrahigh voltage classes, designed and manufactured at Izolyator plant.

We continue to develop our dialogue with international energy corporations thanks in part to the active support of Russian energy companies. Thanks to the daily work with such large companies as PJSC ROSSETI and PJSC FGC UES, we managed to accumulate a unique experience of full scale use of high-voltage bushings with solid RIP insulation. Our main task today is to deliver our idea that we fully possess the necessary expertise and experience to share with a larger number of partners around the world. We are known and trusted in many countries, and our status as a leader in the production of high-voltage bushings, including those with solid RIP-insulation, imposes a serious responsibility on us.

We thank partners and consumers for their long-term cooperation, as well as for the active work and support of Izolyator in developing a dialogue with international power grid corporations and integrating innovative products into the global power industry market.

Meeting with a partner at the booth of the joint venture Massa Izolyator Mehru Pvt. Ltd at the 6th International exhibition Gridtech 2019 in India

Izolyator management representatives at the Indian transformer plant Mehru Electrical & Mechanical Engineers (P) Ltd

23 | International exhibition GridTech 2019 in India: promotion of our new brand MIM

◀ The stand of the joint venture Massa Izolyator Mehru Pvt. Ltd. at the 6th International Exhibition and Conference GridTech 2019 in India

▶ All the events of the 6th International Exhibition and Conference GridTech 2019 in India were successful!

▲ Meetings with business partners at the 6th International Exhibition and Conference GridTech 2019 in India

▼ Exposition of the joint venture Massa Izolyator Mehru Pvt. Ltd. aroused great interest among visitors of GridTech 2019

Installation of the first in Russia 252 kV bushing with RIN-insulation for pilot operation

Preparing the 252 kV bushing with RIN-insulation for installation on a 40 MVA transformer at the 220 kV Dalnyaya substation in the Vladimir region

Installation of a 252 kV bushing with RIN-insulation on a 40 MVA transformer at the 220 kV Dalnyaya substation in the Vladimir region

On May 27, 2019, the installation of the first in Russia 252 kV bushing with solid internal RIN-insulation for pilot operation was carried out in the Vladimir region.

The bushing is installed to replace the outdated analogue with paper-oil insulation on a 40 MVA transformer at the 220 kV Dalnyaya substation of the Main Power System of the Centre — an affiliate of the Federal Grid Company of the Unified Energy System.

The installation work was led by Vitaly Vasin, head of the 220 kV Dalnyaya substation, and Dmitri Mashinistov, head of SVN-Service at Izolyator company.

Izolyator continues to research and implement progressive and most efficient technical solutions aimed at improving the reliability, ease of operation and durability of electric power equipment. ■

Equipment test in the framework of High Voltage Measurements consolidation

Izolyator testing center conducted an inspection of the equipment for the Rosenergoatom Concern and the All-Russian Scientific Research Institute of Metrological Service (VNIIMS).

Joint inspections were carried out as part of the consolidation of efforts in high-voltage measurements and in accordance with the leases of the test room and equipment In particular, the calibration of 750kV voltage dividers intended for the Metrology Laboratory of Rosenergoatom was performed.

Also, we checked metrological characteristics of measuring transformers of 330kV and 750 kV voltage classes belonging to VNIIMS.

Testing was led by the head of the Izolyator test center, Dmitry Ivanov.

All the works were completed successfully, confirming the wide possibilities of the Izolyator test center. ■

Verification of the metrological characteristics of a measuring transformer of 750 kV voltage class, belonging to VNIIMS, at the Izolyator test center

Since early 2019 we developed **23** new solutions of Izolyator high-voltage bushings on **24-550 kV**

The first supervisory audit of Izolyator IMS carried out by TÜV Hessen was completed successfully

Audit of the Integrated Quality Management System

From April 24 to April 26, 2019, Izolyator was examined by the first supervisory audit of the Izolyator Integrated Quality Management, Environmental, Health and Safety Management System (IMS).

The German certification company TÜV Hessen was represented by chief auditor Elena Kostikova, auditor Ekaterina Schukina, auditor Elena Hunusidi, auditor Olga Kuzmicheva.

The audit began with a visit to the corporate museum, where Dr. Alexander Slavinsky, Chief Executive Officer of Zavod 'Izolyator' LLC, and Quality Director Alexander Novikov, introduced guests to the century-long history and achievements of the enterprise.

The IMS audit was carried out in full compliance with the procedures for conducting an audit and certification of TÜV PROFiCERT and was completed successfully. The auditors noted a good level of employee training, as well as the compliance of the IMS with the criteria of international standards. During the audit, the strengths of the IMS were noted, and recommendations were made for the further development and improvement of the management system.

Maintenance and interaction with auditors was carried out by the Izolyator quality department employees: Alexander Novikov, Quality Director, Tatyana Simakova, Head of the Management Systems Development and Control Department, Tatyana Vasina, Head of the IMS Bureau.

Employees of all departments of Izolyator took an active part in the audit.

We thank the TÜV Hessen auditors for their work and appreciation of the Izolyator Integrated Management System! ■

TÜV Hessen Auditors at the Izolyator company museum

Meeting with manufacturers and suppliers of power equipment

Dmitry Mashinistov (right) and Konstantin Sipilkin (second from right) are in the MPS Siberia among the participants of the meeting

Izolyator took part in the meeting on the operation of electrical equipment at substations of the Main power networks of Siberia, interaction and cooperation with equipment manufacturers.

The event was held at the head office of MPS Siberia in Krasnoyarsk as part of an in-person meeting of the First Deputy General Director — Chief Engineer of MPN Siberia with Deputy Directors — Chief Engineers of MPN enterprises and heads of structural divisions of the MPN technical unit. Izolyator was represented by Konstantin Sipilkin, R&D Director, and Dmitry Mashinistov, head of SVN-service.

The meeting with invited manufacturers and equipment suppliers was held in the format of reports with subsequent answers to questions from the audience. Dmitry Mashinistov spoke on the production and operation of Izolyator high-voltage bushings.

A direct, open and mutually beneficial dialogue of specialists guiding the operation of power equipment and its developers and manufacturers took place.

The meeting participants emphasized the great practical value and advisability of developing such a form of cooperation.

According to the results of the event, it was decided to discuss the possibilities of organizing such seminars for technical specialists of the operation services of MPN Siberia. ■

26 | Organizational Aspects Of A Modern Russian Cable Fittings Manufacturing Plant

Technical Director at Izolyator-AKS LLC Dmitry Lopatin

Izolyator is a flagship company and market leader in production of high-voltage and ultra-high-voltage bushings on alternating and direct current in Russia. Over its more than a 120-year history, the plant has always been at the frontier of innovative development and a supplier of talent preparing highly professional engineers. The accumulated over years knowledge of the power markets of Russia and foreign countries, experience with materials and compounds, RIN insulation and organosilicones provided the company management with an opportunity to timely create a new business line - production of high-voltage cable armature of all types (connecting, end sleeves and couler plugs) for voltages in 110 - 550 kV range.

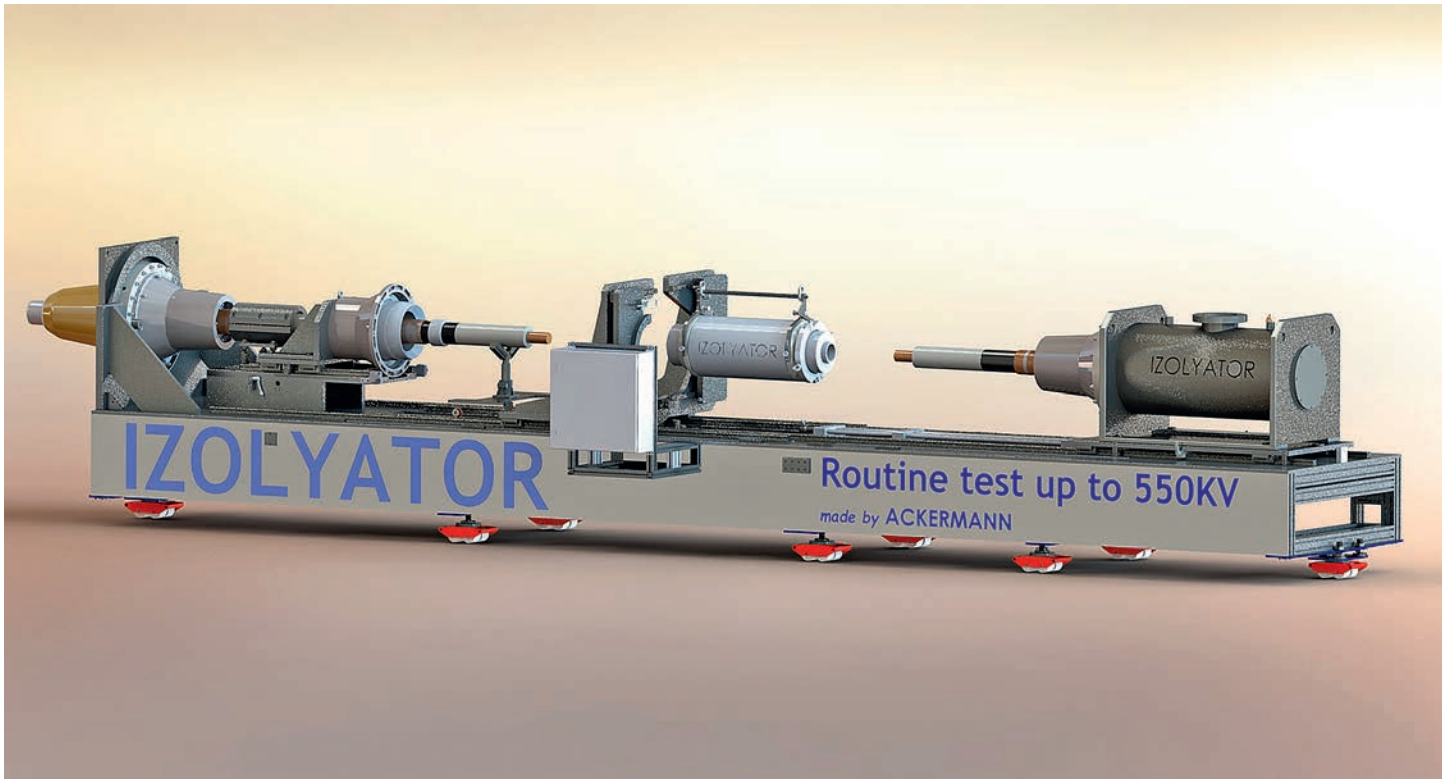
The ongoing diversification goes well with the traditional product line of the company, based on bushings for cable connection of transformers, and is a practical result of the state policy of localization and implementation of innovations that ensure the highest quality and reliability.

In April 2019, Izolyator established a new business line - Izolyator - AKS LLC, which was intially tasked with such objectives as development of engineering drawings and documentation, set up serial production of cable fitting and start sales and exports in the shortest time.

Presently, Izolyator-AKS proceeded to the project realization. The company management pays a special attention to using key factors of successful of development, such as:

- design of modern day cable fittings branded Izolyator - AKS, procurement and commissioning of modern equipment from the leading OEMs;
  Selection of contractors for cable armature design and suppliers of core production and testing equipment with subsequent supply and maintenance agreements signing became a groundbreaking stage in project development. For instance, Vogel moulds und machines AG (Hedrich Group) equipment, which is a global leader in technology, will be used for casting silicone components of cable armature. It would allow to efficiently plan and run production processes. That equipment would enable Izolyator - AKS to

Silicone degasing unit On the fly, by Vogel



Ackermann high-voltage test bench

make products that not only meet but in a number of features exceed counterparts, presently manufactured by domestic and overseas competitors.

For organization of high-volage testing on the premises of the future manufacturing plant, we selected the most advanced equipment of HIGHVOLT and ACKERMANN from Germany. The concept of testing in own high-voltage laboratory allows for organizing them in SF6 gas system, helping to reliably decrease noises of equipment and cables at testing to less than 2 pC.

- ensuring a maximum possible localization with the highest quality and reliability;

The preliminary analysis of production capacities shows that up to 70% of product's prime cost an be achieved at Izolyator, while 20% will be bought from Russian suppliers, leaving only 10% to import from CIS and non-CIS countries.

- availability of sufficient storage stock for meeting short delivery terms;

According to the power market studies, the demands and specifics of purchasing activities of customers prove to be subject to very pressign delivery terms. Taking into account the fact that almost all foreign suppliers of similar products cannot meet requirements of cable armature shipment from a warehouse, our young project is receiving a chance of successful market entry. To actually do that and reach a competitive advantage, we plan to maintain a certain stock of cable armature in so-called modular execution for every voltage class and cable section and organize supplies in shortest possible time, accomplishing projects of any scale.

- high level of quality and product reliability;

At Izolyator - AKS, we achieve quality by, on the one hand, multistage control of engineering documentation, materials and manufacturing processes and an improved technology, based on the existing experience and modern approaches to production.

On the other hand, the products' reliable operation will be ensured by having own service center, which will be created for also training installation fitters as the installation of cable armature became one of key factors ofits long-term operation.

- organization and implementation of lean production, certification of business processes;

Izolyator - AKS will abandon unnecessary time losses with optimization of control systems over the product cost and expenditure of funds as it develops its core production and operation processes. It will also implement the world's best practice in process management, reflected in international standards of ISO series (9001, 14001, 50001).

The above mentioned competitive advantages will allow Izolyator - AKS to reach the goal: to offer the Russian and global markets a high quality product, meeting the strictest requirements of customers and possessing an optimized cost by means of highly advanced technologies and processes, leading to decreased costs on all stages of product lifecycle.

Doskosil dosing unit, part of Vogel equipment set

Yaroslav Sedov,
Head of Marketing Department at Izolyator

In the modern world of business there is a constant tightening of competitive methods. In the global market there's an obvious trend of rapid technology development and the creation of new ones, it is necessary to have a strategic vision for the successful operation of the company. Formation of such vision requires a deep study of the market and its features, which is one of the main areas of marketing.

In accordance with our mission, company management decided to establish marketing department. The main tasks of which are:

1) Structuring the available and analysis of new information about the market, the choice of new markets.

2) Work with the consumer.

3) Participation in the strategic planning of the company is a priority for the marketing department.

4) Company assortment management.

Currently, the global electric power industry market is undergoing major changes. The global demand for energy consumption is increasing every year. This leads to a significant increase in quantity of market players, the strengthening of old and the emergence of new international relations and projects. One can also note that current trends lead to more conscious consumption, including the development of renewable energy, which also contributes to the expansion of the market. All this leads to a tightening of the competitive environment, there is a struggle for each consumer.

In order to operate successfully in such dynamic conditions, you need to have a strategic vision, to be able to respond quickly to changes and introduce modern tools into the organization's management methods.

The new direction of the company's activity is to analyze both external and internal factors affecting the enterprise and the market.

The marketing function is also expressed in conducting market monitoring, tracking trends, and finding new free niches and markets.

In addition to analyzing the market, the functions of the department imply active work with consumers, namely, understanding the customer's values and needs, as well as doubts when choosing new, more technological bushings - we need to bring the dialogue to the new level. Consumer segmentation will be conducted, target audience will be determined and effective communication channels will be developed. Based on this analysis, it is planned to adjust our product line-up, which is going to be a huge challenge taking into account the wide range of products sold throughout the world and region-specific needs in various parts of the world.

One of the main tasks of the marketing department is Structuring and analysing the new available information on the electric power market in Russia and in all over the world, monitoring trends and identifying key competitors, as well as providing.

Top priority of department's work is participation in the enterprise operations strategic planning. With expert knowledge of the market, competitors, consumption patterns, it is possible to develop an optimal growth strategy, increase the competitiveness of our product, and identify key sales markets.

2050 World power industry in 2050 - projections

Global growth dynamics comparing to 2018

Share of renewable energy in the world power generation, comparing to 7% in 2018

Qty of electric cars on the streets, which amounts to 30-90% of total LDV park

World gas consumption comparing to 3,900 Bln m3 in 2018

Global power industry CO2 emission comparing to 33.1 Gt in 2018

World oil consumption compared to 99 MMbbl in 2018

*Energy Perspectives 2019. Equinor.

Power generation structure in UES of Russia, % (as of 01.01.2019)

Structure of installed capacity of UES of Russia's power plants, % (as of 01.01.2019)

UES of Russia Electric energy demand forecast till 2025

In the very near future, your company can establish even closer cooperation with the Indian industry and the Indian energy market.

Mr. D. John Srinivas,
Transmission Corporation
of Telangana Limited

Izolyator has achieved excellent results in the Indian market and this is great. In the very near future, your company can establish even closer cooperation with the Indian industry and the Indian energy market so that India and Russia thrive together for the benefit of the whole world.

Transmission Corporation of Telangana Limited (TSTRANSCO), the state-owned regional power grid company of Telangana state, was formed as a result of the restructuring of the power industry in India. The Andra Pradesh energy company APSEB, established in 1959, was originally responsible for the generation, transmission and distribution of electricity.

In 1998, in accordance with the energy sector reform agenda, the State Government announced the separation of APSEB into APGENCO, a transmission company, APTRANSCO and four distribution companies, APDISCOM. In 2014, APTRANSCO was divided into regional network companies TSTRANSCO and APTRANSCO.

Inspection tests of Izolyator bushings for Indian companies

Participants of the inspection of Izolyator bushings made for the Indian company Transmission Corporation of Telangana Limited

In April Izolyator conducted series of inspected tests of high-voltage bushings to be delivered to the Indian company Maruti Suzuki India Ltd. as part of transformer equipment manufactured by Prime Meiden Ltd., which is part of the holding of Meiden India Pvt. Ltd.

The acceptance tests of the "oil — gas" bushings for a voltage of 252 kV and a current of 1600 A were inspected.

Inspection was conducted by Deputy General Manager of Maruti Suzuki India Ltd. Sushil Kapoor and Senior Manager Marketing and Sales, Meiden India Pvt. Ltd. Pankaj Gulati.

In May Izolyator carried out series of inspected tests of high-voltage bushings to be delivered to the Indian state regional power company Transmission Corporation of Telangana Limited as part of transformer equipment manufactured by Toshiba Transmission & Distribution Systems (India) Pvt. Ltd.

The acceptance tests of bushings with internal RIP insulation that were inspected: 52 kV / 3150 A, 252 kV / 2000 A and 420 kV / 1250 A.

Inspection was conducted by TSTRANSCO Director Mr. S. Ashok Kumar, TSTRANSCO Chief Engineer Mr. Srinivasan, Megha India International Corporation General Manager Mr. Raghu, TTDI Testing Manager Mr. Harshavardhan.

Dmitry Orekhov, Manager of International Business Development dept. at Izolyator, actively participated in the inspection of tests. Testing was led by the head of the Izolyator test center, Dmitry Ivanov.

The tests were carried out in full compliance with the approved program and ended successfully. ■

Negotiations with representatives of the Shenyang Transformer Research Institute from China

Visit of representatives of Shenyang Transformer Research Institute

In April 2019, Izolyator was visited by a representative group of managers and specialists of the Shenyang Transformers Research Institute from China.

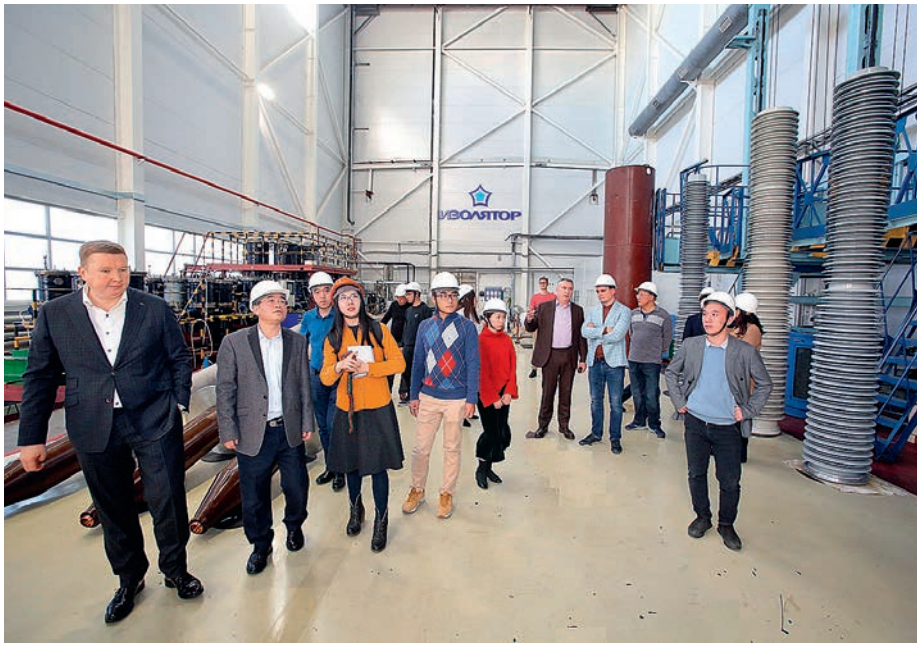
The purpose of the visit is the exchange of professional experience and acquaintance with the technological and production capabilities of Izolyator plant.

The guests were welcomed by Dr. Alexander Slavinsky, Chief Executive Officer of Zavod 'Izolyator' LLC and Ivan Panfilov, Commercial Director, 1st Deputy CEO at Izolyator.

Representatives of STRI got acquainted with modern technologies for the production of high-voltage bushings with RIP-insulation and new developments of Izolyator.

During the visit, negotiations were held on the development of comprehensive cooperation.

The visit of STRI representatives to Russia took place within the framework of the implementation of the Agreement in the field of product conformity assessment with national standards, technical regulations and other regulatory and technical documents. The document was signed in August 2018 in Paris during the 47th Session of the International Council on Large Electric Systems (CIGRE). ■



Representatives of the Shenyang Transformer Research Institute from China at the Izolyator Test Center

Inspection of bushings ordered by the China XD Group

Participants inspect the bushings made by Izolyator for the China XD Group

In June 2019, Izolyator underwent an inspection of bushings made according to the order of the China XD Group.

For the inspection Izolyator was visited by Chief Representative of Xian Electric Engineering Co., Ltd. in Russian Federation, Qin Weijun, Manager of European Business Department Yanwen Zhang, Advisor to the Director General of the Energosetprojekt Institute, Alexander Glushkov.

As part of the China XD Group holding company Xian Electric Engineering Co., Ltd. exports and imports electrical equipment.

Izolyator plant was represented by Alexander Znamenskiy, Manager of International Business Development dept. Marketing specialists Anastasia Serpuchenko and Denis Grankin took an active part in the events of the visit.

The inspection team examined 110kV bushings with solid internal RIP insulation located in the finished product warehouse.

During the inspection, our guests visited the manufacturing facility, where they were shown the main stages of the technological cycle of high-voltage bushings manufacturing.

The inspection was completed successfully, confirming the high quality of Izolyator products.

Following the meeting, the parties expressed confidence in further fruitful cooperation. ■

Our goal is to cooperate with world-class partners in order to meet the highest requirements of our customers, so we establish mutually beneficial relationships with Izolyator.

Ireneusz Zawadski,
component purchasing manager at Eltel Networks

One of our main goals is to provide the best maintenance and upgrading services at high voltage sites. Our goal is to cooperate with world-class partners in order to meet the highest requirements of our customers, so we establish relationships and cooperation with Russian companies, such as Izolyator.

In power sector in Poland there are two companies operating under Eltel Networks brand offering construction and maintenance services for the companies in the power industry.

Thanks to the close cooperation of companies operating in power sector under Eltel Networks brand in Poland the range of offered services is very wide.

In order to meet the needs of key customers — Polish Power Grid (PSE) and distribution utilities all around Poland — Eltel Networks companies are currently extending and improving the implementation of new technologies such as 220 kV and 400 kV lines equipment and adding new services.

First Visit

Representatives of the Polish transformer plant EthosEnergy Poland S.A. inspect the 40.5 kV bushings manufactured for them at Izolyator

For the first time Izolyator was visited by representatives of the Polish transformer plant EthosEnergy Poland S.A.

EthosEnergy Poland S.A. was represented by Transformer Specialist, Chief Designer Michał Mnich, Transformer Design and Technology Department Manager Maciej Wilk Transformer Customer Service Manager Krzysztof Mucha. Our guests were welcomed by Yaroslav Sedov, head of International Business Development Alexander Znamensky, manager of export sales and Viktor Kiryukhin, lead technical support specialist

At the talks, Izolyator party made a presentation of the plant, its history and products as well as our immense experience and sound achievements in the development of international cooperation in various regions of the world. Representatives of EthosEnergy Poland S.A. visited the production site, where they were shown high-tech equipment and the main stages of production of high-voltage bushings with solid internal RIP and RIN insulation. Also, guests could see 40.5 kV bushings on the final stage of production, when finished they will be shipped to EthosEnergy Poland S.A.

Dmitry Ivanov, Head of test center, demonstrated the equipment and introduced the guests to the process of testing finished products. Upon completion of the visit, our guests gave a high assessment to production and technological potential of Izolyator plant and its products.

The parties agreed to develop our mutually beneficial cooperation and, in particular, to consider the possibility of further shipments of the Izolyator high-voltage bushings for the needs of the transformer plant EthosEnergy Poland S.A. and the Polish state power grid company Polskie Sieci Elektroenergetyczne S.A.

We appreciate the EthosEnergy Poland S.A. plant for the high evaluation of Izolyator production and full confidence in the quality of our products! ■

Status - official supplier

State Saudi Electricity Company included Izolyator plant in the list of official suppliers in the "high-voltage bushings" direction for transformer plants in Saudi Arabia.

Saudi Arabia electrical market penetration is another evidence of the highest quality of Izolyator products and the effectiveness of its policies for the active development of international cooperation in all regions of the world.

The prelude to this event was a January 2018 visit by a representative of the Saudi Arabian General Investment Authority (SAGIA) to Izolyator. SAGIA is organization that oversees investment activities in Saudi Arabia, including foreign investment. SAGIA's tasks also include assisting foreign companies in promoting their technologies and innovations in the economy of the Kingdom. The guests highly appreciated the production and technological potential of the Izolyator plant.

The establishment and development of contacts with energy and industrial companies of Saudi Arabia is held with the support and active participation of Business Partners Association for Cooperation with the Kingdom of Saudi Arabia (RUSA Association).

We appreciate the Saudi Electricity Company for the confidence and appreciation of the quality of our products!

We invite all developers and manufacturers of electrical equipment to jointly promote products and participate in the development of long-term cooperation with business partners in Saudi Arabia! ■

New Market Opportunities

The leaders of South Korean Artex Corporation get acquainted with the technology of production of high-voltage bushings at Izolyator

In May 2019, Izolyator was visited by the top managers of the South Korean corporation Artex Corporation President Charlie Chang and General Manager Eugene Jang.

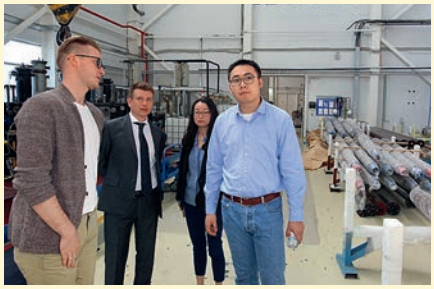
Izolyator was represented by employees of foreign trade department — Head of Marketing Department Yaroslav Sedov, manager Alexander Znamenskiy, marketing experts Anastasia Serpuchenko and Denis Grankin.

Negotiations were mainly devoted to Izolyator manufacturing and technological potential in development, production and supply of high-voltage AC and DC bushings of various voltage classes. In addition, parties discussed opportunities and prospects of launching sales on South Korean electrical market.

On a tour of the enterprise, guests were introduced to the technological manufacturing cycle of high-voltage bushings with solid internal RIP and RIN insulation.

The Artex Corporation management visit helped to build full confidence that the modern high-tech production complex of Izolyator ensures the release of quality products that meet the highest international standards. Following the visit, a plan for the development of business relations in the near and distant future was formed. ■

Unique experience of groundbreaking projects



Representatives of the Chinese company Samgor Technology Ltd at the site of the assembly of high and ultra-high voltage bushings at Izolyator plant

Izolyator was visited by representatives of the Chinese electrical company Samgor Technology Ltd. — CEO Jacky Gu and Marketing Manager Jean Zhang.

Guests were welcomed by Head of International Business Development Department Andrey Shornikov, Head of Marketing Department Yaroslav Sedov, manager Alexander Znamenskiy, marketing experts Anastasia Serpuchenko and Denis Grankin.

The visit began with a tour of the Izolyator company museum, where guests were introduced to the main historical milestones of the enterprise's development. Then there was a presentation of the Izolyator plant, its products and successes achieved in international cooperation.

During the negotiations parties discussed the possibility of establishing and developing partnership in the supply of bushings with a voltage of 500 kV and above to China.

The guests stressed the importance of both the supply of bushings to the existing facilities of the country's electric grid infrastructure and participation in promising projects of the China electric grid company Shanh Donh Electricity. In turn, representatives of Izolyator emphasized the large and unique experience of the company in creating high and ultra-high voltage bushings, as well as the corresponding production and technical potential, which allows them to effectively implement such projects.

After the successful completion of the negotiations, an excursion around the workshops of the company took place, during which the guests were presented to modern production technologies of high-voltage bushings with solid internal RIP and RIN insulation. Head of the test center, Dmitry Ivanov, presented the equipment and the main types of testing of finished products.

At the end of the visit, the parties agreed to develop business contacts and continue to work together on the main topic of the past negotiations. ■

GEOGRAPHY OF DELIVERIES

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

I - II QUARTER 2019

14 COUNTRIES

- Belarus
- Belgium
- China
- Czech Republic
- Estonia
- India
- Kazakhstan
- Latvia
- Moldavia
- Poland
- Russia
- Turkey
- Ukraine
- Vietnam

Kara Sea

Laptev Sea

RUSSIA

MONGOLIA

CHANGJI

CHINA

INDIA

VIETNAM

Sea of Okhotsk

Sea of Japan

Philippine Sea

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

Power Grid of Italy: New Sources of Energy and Market Technologies

As a co-project of ELECTRIC POWER. Transmission and distribution Magazine and the System Operator of the Unified Energy System done with support from GO15 Association, we begin to introduce our readers to the system operators of the largest power grids of the world. An interview with Luigi Ferraris, General and Executive Director at Terna, which exerts functions of Italia's system operator, opens the series of interviews.

- Mr Ferraris, what are the unique features of the power system of Italy?

- The specifics are coming from the geographic location and emerge from lack of possibility to develop interconnecting ties in sufficient volume. Firstly, it concerns cross-border connections, most of which are concentrated in the north of the country. Secondly, there is the same problem exisiting on the nation-wide level involving ties between regions as well as between the mainland and insular lands of the country.

This configuration causes bottlenecks to emerge in the national electric network, especially on links between the northern and southern regions and ultimately causes division of the power market into trade zones: Northern, Central-Northern, Central-Southern, Southern, Sicilia and Sardinia.

The electric energy prices in Italy are higher than in the neighbouring countrie (mainly for the reasons of generation structure), which in turn stimulates substantial amounts of import.

Over the past ten years, we have seen the renewable energy power generation strongly growing. It aggravated the problem of power supply stability and the energy system sustainable operation. The green energy already covers 35% of demand for electricity.

- What are the challenges in energy system management that are coming to prominence today?

- The biggest challenge is the need of integration of the ever-growing volumes of unstable green generation in the power grid with a parallel process of downsizing of traditional generation capacities and some specifics of the power system that we spoke above. All those factors have a negative influence on the fundamental security indicators, adequacy and efficiency of the power grid.

The overloads in electric network, increase of run time and volume of non-demanded production of renewable energy, steepening of the load curve in the evening, lower reliability of the power grid in critical situations, especially in extreme weather conditions (drought, swelter, cold), drop of possibilities to regulate voltage and frequency and keeping down short circuit currents - these are some case studies. Over 30 GW of solar and wind power plants are integrated in the Italian power system (the record high in capacity consumption in Italy totals to about 60 GW).

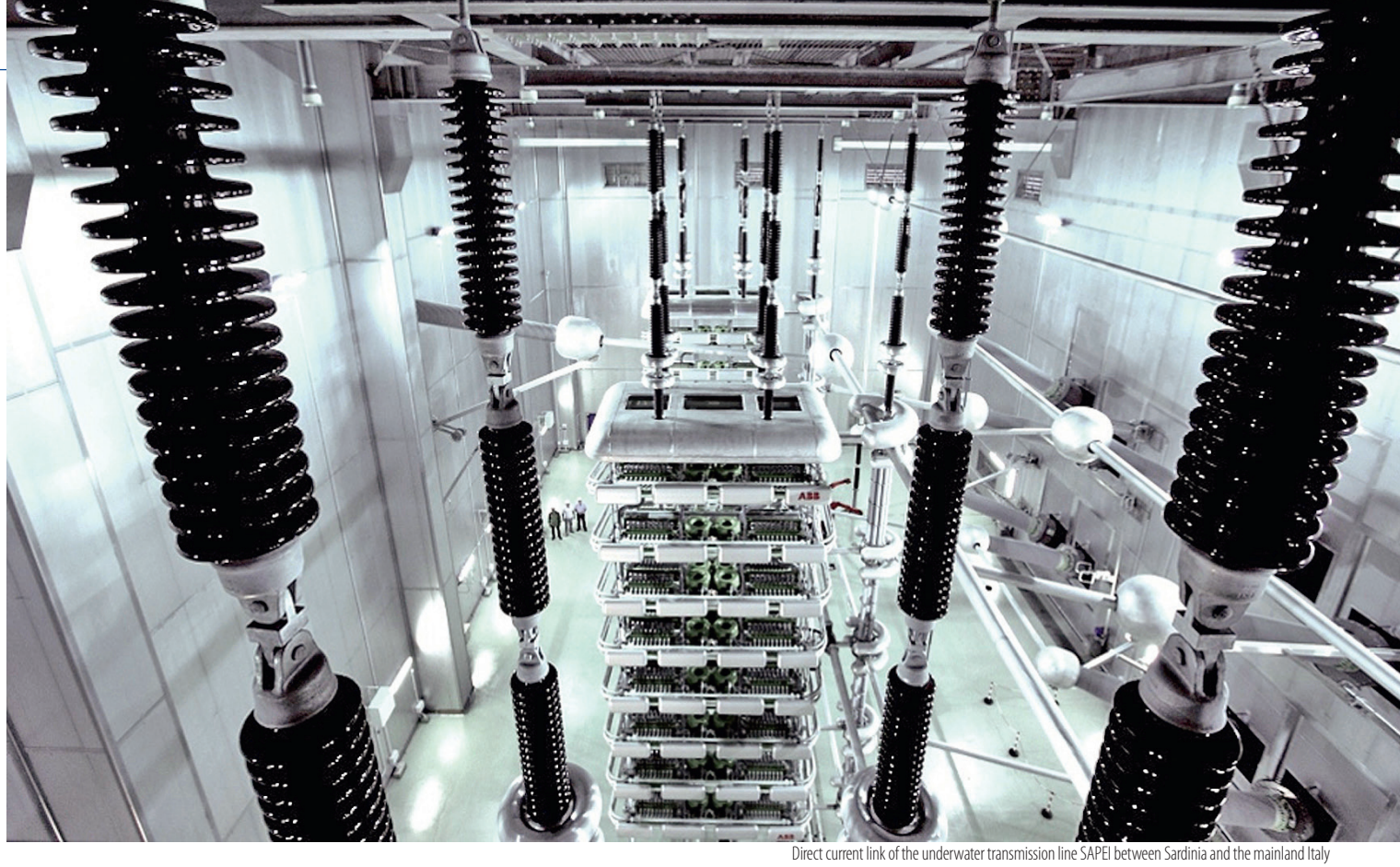
Generation of electricity from renewable sources of energy has an unstable nature and depends on availability of primary resources, therefore they are uncapable of guaranteeing a stable production of electric power and can be inaccessible in situations of emergency in the power grid.

Besides, most of green energy facilities are connected to low and medium voltage networks, which are out of direct control of the system operator.

The situdation tends to aggravate in the coming years, which fact is backed by all European and national power industry scenarios. Thus, the National complex power industry and climate plan, recently submitted by the Italian government to the European Commission, sees growth of generation from renewable sources by 40 GW (about 30 GW - solar energy and 10 GW - wind) by 2030 to a complete refusal from using coal by 2025 (so far 7.2 GW of generating capacities run on coal).

- What is Terna's basic approach to the network infrastructure development? Have the investment patterns changed over the past ten years?

- Over that period of time, Terna has invested about 10 billion euros into development of the national transmission network. The process can be divided into at least three stages. 2005 - 2010 - development of ultrahigh voltage network of 380 kV, giving possibility of new combined-cycle power plants con-



Direct current link of the underwater transmission line SAPEI between Sardinia and the mainland Italy

nection as well as lower voltage transmission network to improve service for the consumers and solving the problem of critical transmission constraints.
At the second stage, in 2010 - 2014, new investment on modernization of 120 - 150 kV network was required for ensuring connection of generating facilities on renewable sources and construction of new substations.
For the third stage, such phenomena as «civic opposition» and the so-called syndrome «not in my yard only» became characteristic. In connection, all social and ecological aspects are gaining more importance and influence the power network infrastructure development, beginning with initial planning.

- How is the long-term planning arranged in the industry?

Terna is directly responsible for planning the power grid, developing plans on the basis of long-term energy scenarios of the national and pan-european scale.
Thus, the ten-year plan is corrected annually. It is approved by the Ministry of economic development of Italy and takes account of opinions of all interested parties.
The Italian sectoral regulator makes sure the plan is relevant to the targets as set by the existing legislation in power industry, while the ministries of environment and social heritage would evaluate its inpact on the environment.
Starting from 2005, Terna runs return on investment analysis of all investment projects - till 2017 with planned budget over 25 mln euros, presently, the entry level is fixed at 15 mln euros. The analysis according to the approved by regulator methodology is set on energy, economic, ecological indicators. It is based on the static probabilistic modeling of the market and power grid and includes two options of scenario: with investments in power grid projects and without them.
Since 2018, additional indicators have been included in the methodology. Among the criteria there are improvement of the social and economic well-being, decrease of undersupply of energy, integration of renewable energy generation and ecological advantages of investment projects implementation.
Over 80% of planned for implementation projects from the development plan have passed assessment under the new methodology.
Presently, there are novelties in planning and development expected in the power system of Italy, which would correpond to the current condition of the power industry of the country. The energy systems with a stable and moderately growing demand in combination with a strong growth of green energy share, possessing nearly zero variable operational costs (the power system of Italy is exactly the type of such systems) require establishment of efficient long-term price signals allowing to guarantee funding of new generation facilities in specific period of time in specific locations. Such signals can be formed via purchase and sale agreements of electric energy for renewable energy generation, the capacity market for effecient and less-polluting thermal power plants, long-term contracts with winners of tenders - for suppliers of grid services.
In the first half of 2019, we expect to have a final approval of the legal framework by the national and european authorities allowing to create a capacity market in Italy - to proceed to capacity suppliers selection with expected deliveries in 2022. It will help to have a reliable power system by using efficient thermal power plants with a low emission rate and gradual decarbonization of electrical power industry without lowering quality standards of power supply.

Adapted from materials of press service of SO UES JSC

Please refer to the complete text of the interview in the ELECTRIC POWER.Transmission and Distribution Magazine

We cooperate with partners both domestically and abroad. Over the years, we have justified the trust of our partners, expanded the line of goods and services

Sergazy Kuntuarov
CEO Asia Trafo LLP

Cooperation with Alageum Electric is a guarantee of quality and reliability. 22 years we provide products in the field of electrical engineering and are proud of our history!!! We cooperate with partners both domestically and abroad. Over the years, we have justified the trust of our partners, expanded the line of goods and services! We do not stand still and keep pace with the times.

What differentiates Asia Trafo from other plants? First, progressive and environmentally friendly technologies have been introduced into production, many of which have recently begun to be used by global manufacturers. Secondly, the latest production management system has been installed, based on modern software and the experience of world leaders in mechanical engineering on a turnkey basis. Thirdly, E-document management and visualization give us the opportunity to follow the production cycle of each transformer, starting from application receipt to its performance monitoring during the entire period of operation at the end user. Fourth, comfortable working conditions for factory workers.

Opening of a new transformer plant Asia Trafo in Kazakhstan

On April 26, 2019, Chief Executive Officer of Zavod 'Izolyator' LLC Dr. Alexander Slavinsky took part in the opening ceremony of the new transformer factory Asia Trafo in Chimkent, Kazakhstan.

Alexander Slavinsky personally congratulated top-management and employees of Asia Trafo on this event.

During the event, Alexander Slavinsky met with the top management of the holding company Alageum Electric, which was represented by the chairman of the supervisory board Saidulla Kozhabaev and the chairman of the board of directors Yerkibulan Ilyasov.

In addition, Sergazy Kuntuarov, General Director of the Transformer Plant Asia Trafo, and Alexander Slavinsky held a brief business meeting, which outlined strategic directions for the development of cooperation between the two enterprises.

As invited guests, Arthur Nazarov, Director General of Chirchiq Transformer Plant, and Sergey Sentemov, Advisor to the General Director, Sales Manager of the Togliatti Transformer Plant, took part in the event. Alexander Slavinsky also met with these representatives of the electrical engineering enterprises – Izolyator partners. We appreciate the Asia Trafo plant represented by the general director Sergazy Kuntuarov for invitation to this outstanding event in development of the electrical industry in Kazakhstan! ■

Alexander Slavinsky (left) and General Director of Chirchiq Transformer Plant Artur Nazarov at the opening of the new Transformer Plant Asia Trafo in Kazakhstan

Meeting with management of the Chirchiq transformer plant in Uzbekistan

Alexander Slavinsky (left), Head of Foreign Economic Activities at Chirchiq Transformer Plant Elmira Shafikova and General Director Chirchiq Transformer Plant Arthur Nazarov

In April 2019, a business meeting took place with top-management of the Chirchiq Transformer Plant in Uzbekistan, Chief Executive Officer of Zavod 'Izolyator' LLC Dr. Alexander Slavinsky and ChTZ General Director Artur Nazarov agreed on a strategy for the further development of long-term cooperation based on the progress achieved in joint activities and common goals for the future.

The head of the foreign economic activity department of the ChTZ Elmira Shafikova and Head of CIS Sales at Izolyator Maxim Osipov also took part in the business meeting.

A visit to the production took place, where the guests got acquainted with the main stages of the production of modern transformer equipment.

We appreciate Chirchiq Transformer Plant represented by General Director Artur Nazarov for the invitation and productive cooperation! ■

Alexander Slavinsky (left) and Maxim Osipov getting acquainted with the production at the Chirchiq Transformer Plant

Big presentation day of the company National Electric Network of Kyrgyzstan

In May 2019, Izolyator took part in the Unified Presentation Day devoted to Digital Technologies in Energy Industry, which was held at the National Electric Network of Kyrgyzstan company in Bishkek.

Unified presentation day dedicated to the 85th anniversary of the Kyrgyz energy system was held as part of the Innovation Implementation Program at the National Electric Network of Kyrgyzstan for 2018–2023.

On the sidelines of the Unified Presentation Day, Maxim Osipov gave an interview to the Kyrgyz media.

Within the framework of the Unified Presentation Day, representatives of Izolyator held a seminar on high-voltage bushings with solid internal RIN insulation. The advantages, design and operation features of these bushings were presented in detail. ■

Maxim Osipov (left) and Viktor Kiryukhin at the United Presentation Day of the National Electric Network of Kyrgyzstan

Andrey Shornikov
Head of International Business Development dept. at Izolyator

The second quarter was unique for us especially due to the events related to working with partners in India. Conducting routine tests of 800kV and 420kV bushings on the basis of the Indian State Central Power Research Institute CPRI is not only a great honor, but also a great responsibility. The test program included a full cycle of high-voltage, current, and special seismic tests of high-voltage bushings for high and ultrahigh voltage classes. Some of them are being continued today, because our task is to create the highest quality product. Separately, I would like to note the participation of company representatives in the 6th International Exhibition and Conference GridTech 2019, where we widely introduced our new joint venture Massa Izolyator Mehru Pvt. Ltd. (MIM). Also, the second quarter will be remembered for the delivery of bushings to CG India for production of transformers for the OMVG project in Africa. It is also worth noting that TOSHIBA India and Prime Meiden Ltd. successfully carried out inspections of our enterprise.

Maxim Osipov
Head of CIS Sales at Izolyator

Human capital is a crucial asset of any company. The fact that we have the opportunity to attract the best specialists to our work is a great success, as well as the fact that we have a wonderful tradition of holding seminars for our partners' employees. Seminars for technicians offer a wide range of opportunities, both for us and for industry professionals who directly use and maintain operation of high-voltage bushings produced by Izolyator. We not only readily answer all questions, but also receive a whole slice of feedback, which in turn helps us to move on, improving our work every day. Open dialogue, the desire to learn and clarify all possible nuances, responsiveness - those are the fundamental principles of our work. Meetings with partners both at their enterprises and at Izolyator emphasize that we are interested in the most trusting, open and honest, mutually beneficial relationship.

We thank all our partners and customers for their confidence and hope for further productive cooperation.

Alexander Znamenskiy
Manager of InternationalBusiness Development dept. at Izolyator

In the first half of 2019, and, in particular, in the second quarter, we intensified our efforts on the promotion of Izolyator products on the Eastern European market. So we had a number of significant meetings with manufacturers of transformers from Poland such as ZREW, EthosEnergy Poland S.A. and Eltel Networks service company. All the participants of these meetings had the opportunity to express mutual interest in establishing productive relations.
It is also worth noting that EthosEnergy Poland S.A. is one of the leading in Poland manufacturers of power transformers used at operating voltage up to 420 kV with power up to 305 MVA. The company is an accredited supplier of the state power grid company of Poland - PSE. We are sincerely glad to have the opportunity to meet in person and discuss the future prospects of the partnership. In May, the representatives of EthosEnergy, headed by the chief designer of the transformer department, visited our production facilities for an audit, and in early June sent a letter on the successful completion of the audit by the Izolyator plant. The auditors noted the high level of technical equipment of our enterprise.

EXPORT II quarter 2019

EXPORT SHARE IN TOTAL SALES **20-30** % CIS AND OVERSEAS

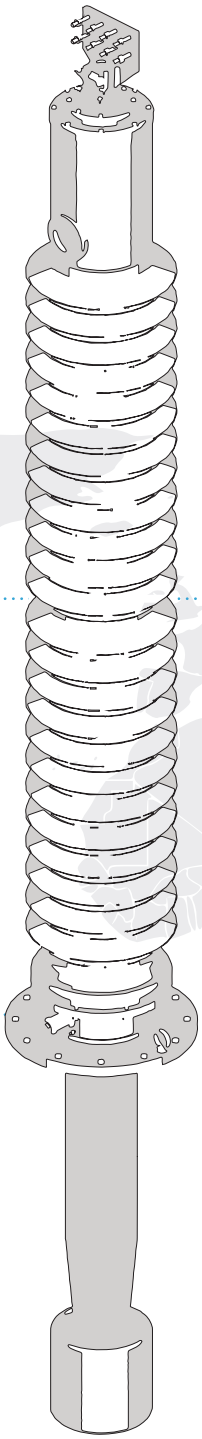
More

140 Bushings

24-750kV

SHIPPED TO CIS COUNTRIES

- Belorussia
- Ukraine
- Moldova
- Kazakhstan



150 Bushings

52-800kV

SHIPPED TO POWER FACILITIES OF INDIA

200 Bushings

35-750kV

SHIPPED OVERSEAS

- Estonia
- Latvia
- Poland
- Czech Republic
- Belgium
- Turkey

We constantly discuss technical aspects of high-voltage bushings manufacturing with specialists of the Izolyator plant».

Oleg Kuklin,
External Cooperation and Procurement Chief at Ufa Transformer Plant

Together with specialists of the Izolyator plant we constantly discuss technical aspects of high-voltage bushings that we utilize in Ufa Transformer Plant manufacturing process and we are actively coordinating plans for the supply of bushings with solid RIP insulation for our plant in Ufa. Izolyator specialists conduct technical seminars for our employees on the most topical aspects of the installation and operation of bushings on "Elektrozavod" transformers.

Ufa Transformer Plant is a modern enterprise with specialization in development and production of power and distribution transformers. The plant was built by Electrozavod JSC in 2009 and today is the largest power equipment manufacturing facility in Russia. Ufa Transformer Plant makes a broad range of power transformers of up to 500 kV voltages and up to 267 MVA.

Meeting at the RusHydro Group on topic of 'Power Machines - Toshiba. High-voltage transformers' transformers supply at the Boguchanskaya HPP

On June 7, 2019, Izolyator took part in a management meeting of companies participating in the Boguchanskaya HPP project, which was held at the head office of the RusHydro Group in Moscow.

The meeting was attended by representatives of the management of companies participating in the project.

The main topic of the meeting was the upcoming supply of transformers manufactured by 'Power Machines — Toshiba. High-voltage transformers', equipped with Izolyator high-voltage bushings, to the Boguchanskaya HPP as part of the station's electrical equipment upgrade project.

As part of the stated topic, issues of coordination and effective interaction of all companies participating in the project were discussed, its technical and organizational parameters were clarified, and a joint work schedule was agreed upon. In the general opinion of all parties, the meeting was held purposefully and effectively.

We appreciate the RusHydro Group for inviting and organizing a constructive dialogue! ■

Management meeting of companies participating in the Boguchanskaya HPP project, L-R: Maxim Zagrebin and Konstantin Sipilkin

Business meeting with representatives of Tolyatti Transformer plant at Izolyator plant, L-R: Maxim Zagrebin, Irina Shevchenko, head of partner cooperation department of the Togliatti Transformer plant, Anna Roslyakova, Ekaterina Zenina and senior engineer of the procurement department of the Togliatti Transformer plant Anton Chuvashov

Following the principles of interaction

In April 2019, Izolyator held a business meeting with representatives of the Togliatti Transformer plant. Meeting was attended by the head of partner cooperation department, Anna Roslyakova, and senior engineer of the procurement department, Anton Chuvashov and Izolyator was represented by Maxim Zagrebin, head of OEM sales, Irina Shevchenko, Head of the Logistics Group, and Ekaterina Zenina, Manager of OEM sales.

During the meeting parties discussed issues of further cooperation implementing existing agreements and future joint projects for the supply of electrical equipment to Russian power facilities.

Additionally guests were taken to a tour of the plant with deep discussion of the technological process of production and testing of high-voltage bushings, and a Q&A session to clarify all the details.

Following the meeting, the parties clarified the principles of interaction in the process of joint activities and outlined measures to strengthen and develop mutually beneficial cooperation. ■

Interim results analysis

Maxim Zagrebin, Head of OEM sales at Izolyator, held a working meeting at the Manufacturing complex of OJSHC «Electrozavod» in Moscow. The other party was represented by the Head of the Unified Constructions Bureau of OJSHC "Electrozavod" Alexander Egorov.

Maxim Zagrebin (left) and Alexander Egorov, Head of the Unified Constructions Bureau of the Manufacturing Complex of OJSHC «Electrozavod», on the territory of the complex

The parties analyzed the interim results of the implementation of existing agreements and clarified the procedure for further interaction. The technical and commercial details of the pending joint projects were also discussed.

Both parties noted the coherence of teamwork and agreed to build on the success achieved.

We appreciate MC OJSHC "Electrozavod" for the invitation and effective cooperation! ■

Planning and action

Maxim Zagrebin, Head of OEM sales at Izolyator, held a working meeting with management of the Manufacturing complex of OJSHC «Electrozavod» in Moscow.

The other party was represented by CEO Alexander Andrianov, Chief Designer Anton Anikeev, Yury Korotun, head of logistics and production support department.

Primary focus of the meeting was on technical and commercial aspects of the implementation of existing agreements with Rosenergoatom, as well as promising joint projects in the Russian nuclear power industry.

A significant part of the meeting was devoted to building effective cooperation and planning the further development of long-term and mutually beneficial business relations between the two companies.

We appreciate OJSHC «Electrozavod» for invitation and productive cooperation! ■

Participants of the working meeting at the production enterprise Holding company Electrlozavod

Rosseti are planning to carry out a digital transformation of the power grid complex and modernize the main equipment.

Pavel Livinsky
Chairman of the Management Board,
Director General of Rosseti Group

Stable growth of production indicators allowed the Rosseti Group of Companies to demonstrate a positive financial and economic result in 2018. The growth of financial indicators was ensured, and the level of debt was also reduced. In 2018, 762 billion kWh of electricity was transferred, 19 GW of power was connected. The level of losses in the transmission of electricity based on the results of 2018 for the first time in history dropped below 9 % and amounted to 8.95 %.

Rosseti Group — the operator of energy networks in Russia — is one of the largest power companies in the world. The company manages 2,35 million kilometers of power lines and 507 thousand substations with the total transformer capacity of more than 792 thousand MVA. The complex assets of Rosseti Group are represented by affiliated and dependent companies including interregional and a regional distribution grid company.

Meeting of strategic partners

In May 2019, representatives of Operational and Technological Control department of Rosseti Group visited Izolyator. Rosseti Group was represented by Vasily Rozhkov, Head of production planning Dpt, Palina Kanyuka, Deputy Head of production planning and Denis Dorokhov, Lead Expert.

The purpose of the visit was an introduction to the technological capabilities and production potential of Izolyator as well as key stages of production of high-voltage RIP and RIN bushings.

At the corporate museum, the guests had an introduction to the century-long history, milestones and the role of Izolyator in development of the power industry of the country. The hosts arranged for a tour of the shops of the plant, introducing the guests to the modern production and testing technologies of high-voltage RIP and RIN bushings.

The talks began with Alexander Savnov's reports "High-voltage bushings: Russian and world data" and "Izolyator's innovative designs" and proceeded with discussion of the agenda and sharing opinions by the sides.

In the course of the dialogue, the sides discussed the necessity of replacement of oil-in-paper bushings operating over 25 years on Rosseti facilities, track record and specifics of RIP bushings operation in various regions of Russia and a whole number of important areas of cooperation. RIN bushings and Izolyator's new business in design and manufacture of cable fittings received a special mention at the talks. ■

Representatives of the Operational and Technological Control department of Rosseti Group at the meeting at Izolyator

The talks at Izolyator are a success

Unique Experience for the Good of Power Industry

In April 2019, Sergey Petrov, Deputy Head of Power Grid Sector at RusHydro Group visited Izolyator. The guest was received by Chief Executive Officer of Zavod 'Izolyator' LLC Dr. Alexander Slavinsky, Director of Strategic Sales Alexander Savinov and Director of Partner Relations Oleg Bakulin.

The meeting began with a tour of Izolyator corporate museum and introduction to the rich century-long history of the company. The guest marked a unique experience of Izolyator in design and production of high-voltage bushings of various applications, including development and manufacture of high-voltage and ultra-high-voltage custom-made bushings.

The hosts arranged for a plant tour giving explanations about the production technology and testing of high-voltage bushings and answering any clarification questions.

At the talks, the sides discussed possibility of replacement of bushings of obsolete designs that are still in operation by their modern counterparts with solid internal insulation. The sides also paid much attention to modernization of measuring tap assemblies of bushings for their increased reliability. During the talks, Izolyator proposed to run and inspection of high-voltage bushings in RusHydro's reserve stock, using a new dielectric response analyzer.

The sides also discussed plans of RusHydro's technical staff training, including provision of visual aids like replicas of Izolyator high-voltage bushings, practical guidelines on diagnostics and operation of bushings, etc.

In the result of the meeting, the parties agreed on the principles of coordination of joint activities and development of a mutually beneficial cooperation. ■

Visit to our Kostroma partners

Kostroma CHPP-2 (photo: Kostroma Administration)

In April 2019, Oleg Bakulin, director of partner relations at Izolyator, visited the Kostroma CHPP-1 and CHPP-2.

At the Kostroma CHPP-1, the guest was welcomed by the head of the electrical department Yevgeny Kozlov, at the Kostroma CHPP-2 — by the head of the electrical department Igor Chistyakov.

Parties discussed the issues of operation and diagnostics of high-voltage inputs, as well as new technologies of Izolyator, including bushings with solid internal RIN insulation.

All parties noted the exceptional mutual benefit from the meetings held and expressed their intention to actively develop business relations.

We appreciate Kostroma CHPP-1 and CHPP-2 for the invitation and fruitful dialogue! ■

Working meeting with Main Power Networks of the South

In June 2019, Aleksandr Savinov, director of strategic sales at Izolyator, held a business meeting with Main Power Systems of the South — a branch of the Federal Grid Company of the Unified Energy System.

The guest was welcomed by the head of the substation service, Alexander Siryakov, and Chief Specialist of the Substations Operation and Diagnostics Department at MPS South, Mikhail Kovryshkin.

Parties discussed the volumes of the upcoming deliveries of high-voltage Izolyator bushings in 2019-2020.

The nomenclature and terms of delivery were specified taking into account the planned needs of MPS South.

We appreciate MPS of the South for the invitation and productive cooperation! ■

Business meeting in the Main Power Systems of the South, L-R: Alexander Savinov, Head of Substation Service at MPS South Alexander Siryakov, and Chief Specialist of the Substations Operation and Diagnostics Department at MPS South Mikhail Kovryshkin

46 | Digital Substation Technology Application at Operating Facilities

First Deputy General Director – Chief Engineer at Moscow United Power Grid Company Dmitry Gvozdev

Presently, the digital substation technology is actively progressing (hereinafter - DSS), so it is among our priorities to identify technical solutions that would bring economic effects compared to traditional automation and protection technologies in the power distribution network, which will not affect the system's reliability.

There are large feeding centers - 600 substations ranging between 35 - 220 kV, over 40000 distribution stations and transformer substations 6 - 10/0.4 kV, a developed cable network with complex topoloy inside the urban area and far-reaching aerial power lines, equipped with autoreclosers and islanding nodes, rural area in the structure of Rosseti. Moscow region. When making a transition to the DSS technology, it is imperative to work out a uniform approach and principles of implementation of digital technologies avoiding large variety of technical solutions, network architecture, operating modes of new equipment and systems.

The digital substation begins with presentation of data about primary processes in a digital view, that is we need to have data about the currents and voltages that are coming in with the pace of the process in a digital presentation. To have that in place, we should use measuring transformers with a digital output according to IEC 61850-2. Examples are optical current transformers and voltage transformers, current transformers designed on Rogowski coil principles and Hall-effect sensors, voltage transformers executed as capacitive and resistive dividers that have a digital output. However, the equipment of the type is not frequently used, especially on voltages bellow 110 kV, which fact is conditioned by a fairly large cost of such equipment, lack of sufficient positive reference and statistics on its operation, absense of methodological support.

We consider application of measuring transformers with digital output as more appropriate in cases of new construction or modernization of 110 kV and higher facilities.

To implement DS technologies in existing facilities, PASS devices, which ensure integration of existing current transformers and voltage transformers to the process bus under IEC 61850-9-2 protocol, can be used.

In this case, the DSS design has to be done with a view of future replacement of traditional current transformers and their PASS with measuring transformers having a digital output. For transmission of signals of condition of switching devices and their control commands, discrete-time signals converters (DTSC) must be used. They ensure GOOSE messages exchange.

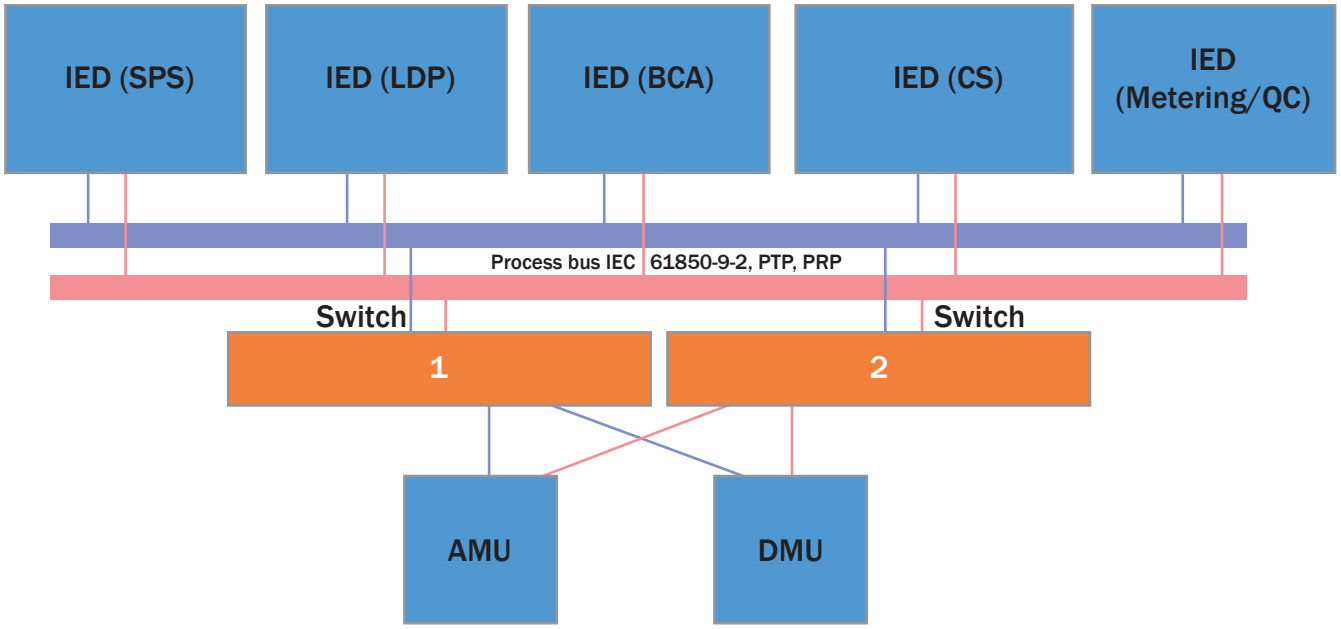


Fig. 1 Example of «unoptimized» level architecture

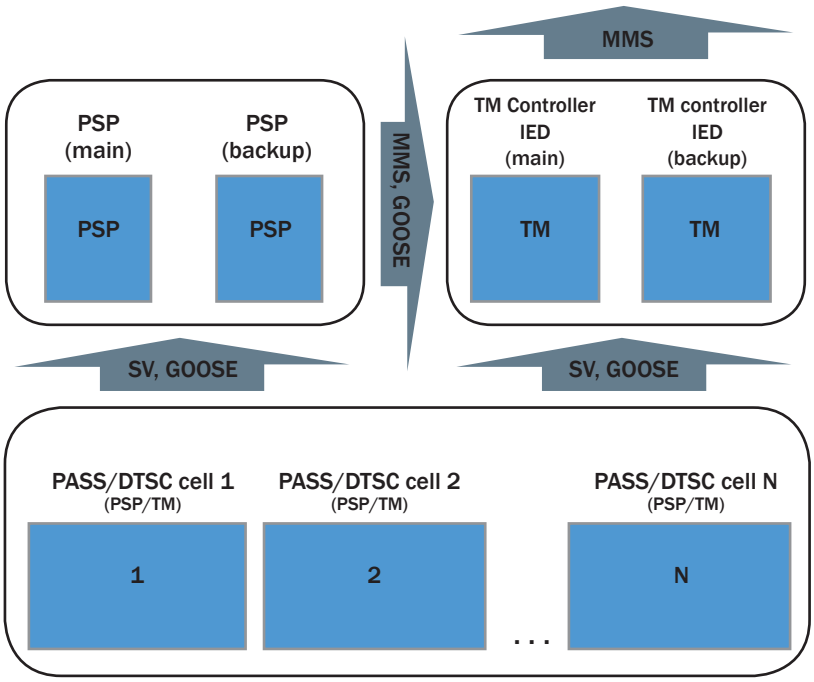


Fig.2 Digital DS 6 - 20 kV block scheme

It is also possible to use devices that combine PASS and DTSC functions if it does not negatively influence reliability and

leads to optimization. When implementing DSS technologies in existing power facilities, it is required to exert a comprehensive approach to the integration of data from the primary equipment to the digital process bus, i.e. the PASS and DTSC devices that are being installed have to be the sources of signals for all secondary systems of substations, ensuring a proper level of reliability and redundancy level for the operation of digital PSP systems, control systems, information-measuring systems and standalone recorders.

An important aspect from the perspective of reliability and capital expenditures is the level architecture of connection to the DSS. The first attempts of digital protection and control systems application were made exactly to preserve the «traditional» architecture, i.e. there is a separate physical device responsible for every separate function, for example, the digital SPS terminal, digital terminal of 10 kV feeder protection, digital CS, digital QC analyzer, etc. At the same time, the device remains conceptually traditional, the data communication method with the outside world is what has changed.

Execution of such architecture of DSS implies a large number of devices, i.e. the quantity of terminals, controllers and other IEDs stays unchanged as in the «traditional» architecture, but analogue and discrete devices of interfacing (PASS, DSS) and LAN switches of the process bus go on top.

Application of such architecture leads to a manifold cost increase of automation systems built on DSS principles compared to «traditional» ones due to a much larger number of physical devices.

The block scheme of such architecture can be found on Fig.1.

The examples of protection and control systems architecture can be found at DSS implementation at 110 kV SS Biryulevo. That substation has a 110 kV open switchgear, executed as: 2 busbar sections of the bypass line, 2 x 110/10/6 kV transformers10 MVA each, 10 kV closed switchgear with 4 busbar sections and 6 kV closed switchgear with 2 busbar sections. There are several digital systems implemented on the substation as digital clusters: digital emergency events recorder (for the whole substation), digital systems of electric power quality control (for the busbar sections 110, 10, 6 kV), digital section 10 kV (PSP and process control system functions). The PSP functions in that project are fulfiled without a physical effect on switching off the 10 kV cells' circuit breakers, the protection system will operate at signal, while the EER system will identify their actuating. This architecture is set to prove its efficiency from the perspective of reliability and cost.

If we consider such facilities as 6-20 kV electrical distribution points (EDP) as an object for DSS technologies implementation, the protection and control system architecture will be similar to the above example with the 6-20 kV switchgear as the principal electrical network of those facilities are nearly identical. Yet, for the facility of that type it is logical to avoid using the busbar as separate switches to optimize costs, and to assign the function of the telemetry controller to the IED.

There is an example of such structure on Fig.2.

The unification of DSS architecture types, used at mid and high voltage power facilities will offer a chance to cut capital and operating costs throughout the entire lifecycle of protection and control systems, helping to more efficiently prepare the operating staff, bringing down the range of software and hardware units, used for development, setting up and operation of such systems.

In the described types of DSS architecture it is allowed to combine functions by quality and quantity indicators in a single digital device of the connection level as a step towards cost reduction.

The implementation of DSS technologies must have an economic effect among others. When making an assessment of such an effect, it is important to consider overall expenses on implementation of secondary digital systems, as digital systems of various applications in optimized types of architecture use the common infrastructure of the process bus (LAN, PASS, DTSC). So, the total cost of digital subsystems is used for the assessment.

CONCLUSIONS

Implementation of DSS technologies gives the following effects:

- increased reliability;
- increased operating features;
- decrease of CAPEX and OPEX by 20 %;
- simplicity and inexpensiveness of system expansion;
- improved level of equipment diagnostics;
- decrease of dimensions of substation control house and overall substation size;
- deep automation of design processes and setting up of secondary systems.

Article by D.B. Gvozdev, First Deputy General Director, Chief Engineer at Rosseti Moscow Region., M.A. Gribkov, Director Relay Protection and Automation, Rosseti Moscow Region, A.A. Sakharov, Deputy Chief Engineer, IT & Communications Dpt at Rosseti Moscow Region, published at ELECTRIC ENERGY. Transmission and Distribution Magazine

Izolyator workshop at Krymenergo Enterprise

Participants of the Izolyator seminar at the State Unitary Enterprise of the Republic of Crimea Krymenergo

In May 2019, Izolyator held a seminar for technical specialists of the State Unitary Enterprise of the Republic of Crimea Krymenergo.

At the workshop Izolyator was represented by Alexander Savinov, Director of the Strategic Sales, and Alexey Pilyugin, Lead Chief Engineer.

The seminar explained the advantages of the use, design, and operational features of high-voltage Izolyator bushings with solid internal RIN insulation.

Technical experts of Krymenergo reacted to the event with great professional interest. During the dialogue, many clarifying questions were asked, to which representatives of Izolyator gave detailed and comprehensive answers.

Concluding the workshop, the parties noted the great mutual benefit from direct communication and expressed interest in developing this form of cooperation. ■

Negotiations with the Interregional Distribution Grid Company of North Caucasus

Alexander Savinov, director of strategic sales at Izolyator, held talks at the head office of the Interregional Distribution Grid Company of North Caucasus.

During the negotiations, the advantages of using high-voltage Izolyator bushings with solid internal RIN insulation on the power grid equipment were presented.

Parties also discussed prospects for the development of cooperation between the two companies, and plans for near and long-term joint activities were outlined.

We appreciate IDGC of Northern Caucasus for the invitation and constructive dialogue! ■

Making An Acquaintance

Izolyator was visited with a familiarization visit by representatives of the generating company PJSC Unipro. The purpose of the visit is to get an idea of the main stages of high-voltage bushings manufacturing process and evaluate the technological level of our production.

The group of representatives of PJSC Unipro was led by the head of the production and technical department Vadim Moskvin. The group also included Deputy Chief Engineer of Surgutskaya SDPP-2 — a branch of PJSC Unipro — Sergey Ustimenko, Deputy Head of the electrical repair shop of Surgutskaya SDPP-2 Yevgeny Tyutikov, Chief Specialist of Production and Technical Department Sergey Sysenko.

In the course of the negotiations held, representatives of Unipro got acquainted with the latest technical solutions aiming to maximize the operational reliability of high-voltage bushings. In addition, our guests learned about the main directions, practical achievements and prospects of the Izolyator plant in the field of international cooperation and integration.

Представители компании «Юнипро» на заводе «Изолятор»

Our guests gladly visited the exposition of the Izolyator company museum, having become acquainted with the main historical landmarks of the establishment and development of the enterprise. After that we visited the production facility, where the full production cycle was demonstrated to our guests and all the advantages of high-voltage bushings with solid internal RIP and RIN insulation were disclosed. They also familiarized themselves with the Izolyator test center.

Summing up the visit, Unipro representatives gave a high assessment to advanced technologies and the level of production achieved by Izolyator plant. ■

Leading expert of the Agency of Quality Supervision Andrei Brizhankin (right) conducts inspection control of the certified production of Izolyator bushings for NPPs.

Under close attention

For two days On May 28 and 29, 2019, Agency of Quality Supervision (QSA) conducted an inspection control of the certified production of Izolyator high-voltage bushings for NPPs.

The control was carried out in accordance with the instructions of JSC Rosenergoatom within the requirements of the Certificate of Conformity granted to Izolyator by QSA on December 6, 2018. Inspection control of production was conducted by the leading expert of QSA, Andrey Brizhankin.

Active participation in the inspection control was taken by employees of the Izolyator quality service: Quality Director Alexander Novikov, Deputy Quality Director Vladimir Ustinov, Tatyana Simakova, Head of Management Systems development, Head of Quality Bureau Tatyana Vasina.

According to the results of the successfully completed inspection control, positive trends in the development of production and a high professional level of Izolyator employees were noted.

We thank the Agency of Quality Supervision for high appreciation of the production and technological potential of Izolyator plant! ■

Inter RAO Supplier's Day

Izolyator took part in the organization of the Inter RAO Supplier's Day. The event was attended by existing and potential suppliers of Inter RAO Group companies.

Izolyator, the official supplier of Inter RAO Group, was represented by Alexander Savinov, Director of Strategic Sales.

In the first part of Inter RAO Supplier's Day, the speakers presented thematic reports: representatives of Inter RAO — Procurement Management Center, the Federal Electronic Platform TEK-Torg, the Energy Without Boundaries Foundation, the Federal Corporation for the Development of Small and Medium Enterprises, All-Russian public organization of small and medium enterprises Opora Russia and other companies and organizations.

In the second half participants had a face-to-face discussion of issues related to both procurement practices and measures

Alexander Savinov (L) and Vitaly Mashkov, Adviser to Director General of the Federal Corporation for Small and Medium Business development on the sidelines of Supplier Day at InterRAO

to support suppliers, operational interaction with suppliers etc.; Proposals to improve procurement activities were considered.

On the sidelines of the event, Alexander Savinov held a number of business meetings with a discussion of topical issues of cooperation.

We thank Inter RAO Group for invitation and trust to the quality of Izolyator products! ■

Mutual Cooperation

Negotiations with UC Rusal at Izolyator plant

In June we held a business meeting with representatives of the United Company Rusal here at Izolyator.

UC Rusal was represented by Evgeny Korotaev, director of supply and installation of Russian Aluminum Management Company, Director of Nizhneboguchanskaya HPP LLC Gennady Korolev, Director of the Power Machinery Design Bureau, Dmitry Razumeiko. Izolyator party consisted of Director of Partner Relations, Oleg Bakulin, Maxim Zagrebin, Head of OEM sales and Lead Technical Support Specialist Viktor Kiryukhin.

Representatives of the United Company Rusal get acquainted with the technology of manufacturing of Izolyator high-voltage bushings

At the negotiations we discussed the possibilities of mounting high-voltage Izolyator bushings with internal RIP insulation on transformer equipment. Especially taking into account their wide and successful operating experience in generating and power grid companies both in Russia and abroad. In addition, during the meeting we discussed the prospects for joint development of new energy equipment for the Angarsk HPP cascade.

The parties agreed to intensify cooperation on the main topics of the talks.

Guests also visited Izolyator production complex, where they examined the main stages of modern production technology of high-voltage bushings with solid insulation. ■

Alexander Savinov,
Director of Strategic Sales
Izolyator

Social networks are full of posts about the most promising professions of the future. And such a seemingly well-established industry as energy is becoming one of the most wanted today. Yes, many power facilities need modernization, but at the same time technologies are being created that make the work of power engineers not only more reliable, but also safer. And we, the Izolyator employees, are pleased to realize that we are making a significant contribution to this significant process.

The Izolyator plant is always open for the visit of partners. What is especially important, we appreciate the interest of our colleagues and partners in how the main stages of high-voltage bushings manufacturing look in practice.

However, for those who have never been to our production, we are talking with absolute openness about the features of the plant. For example, during traditional technical seminars for specialists. The second quarter was rich in visits. One of the highlights in June was a seminar for technical managers of companies of the Far Eastern Federal District of the RusHydro Group.

It is difficult to overestimate the practical benefits of such meetings, and we are glad that we meet such a warm welcome and see sincere interest from our partners.

Oleg Bakulin,
Director of Partner Relations
Izolyator

In the modern world, timely fulfillment of commitments is one of the most important principles underlying long-term and fruitful cooperation. All Izolyator employees strive to always follow this principle. For us, shipment right on time and in accordance with all the terms of the contract is a permanent commitment, which we adhere to, regardless of any external factors. Second quarter of 2019 was no exception, when the shipment of high-voltage bushings went in strict accordance with all agreements. We are sincerely glad that our partners are happy to visit our factory and get acquainted with the main stages of high-voltage bushings manufacturing and the technological level of our production. We are happy to arrange excursions around the Izolyator plant during meetings. We are ready to talk openly about the main directions, practical results and prospects of the Izolyator company activities in the field of cooperation and integration with Russian and foreign partners.

We will continue to delight our partners with new developments and projects.

Maxim Zagrebin,
Head of OEM Sales
Izolyator

Izolyator contributes to the development of energy in different countries, being part of the largest energy projects. In June, Izolyator took part in the conference of the International Association TRAVEK - an excellent platform for discussing current issues and exchanging views of developers and consumers. Today we are launching of a number of international projects in which we plan to participate both directly and together with transformer plants of the Russian Federation and the CIS.

The second quarter is also remarkable as we managed to sign the first supply contract of bushings with RIP insulation for voltage classes 110-220 kV with the ATEF Group.

In the second quarter, much work was done to get approval for our bushings to be installed as parts in transformers intended for the needs of Rosenergoatom and PJSC RusHydro. Separately, we would like to note that we signed a supply contract of the first bushings with RIN insulation for voltage classes of 24-110 kV to transformer plants in Russia. We have prepared an updated program for conducting technical seminars on the peculiarities of the use and operation of RIN-insulated bushings and will gladly present it to our partners.

POWER INDUSTRY OF RUSSIA

II quarter 2019

Unified Energy System of the Russian Federation (UES):

70 energy systmes in **81** REGION

Izolyator plant

Over **1800** BUSHINGS

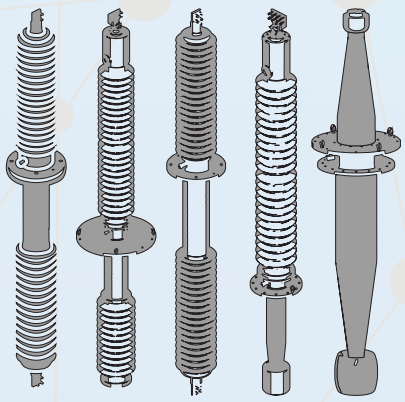
voltage range 24-750 kV delivered to Unified Energy System of Russia

Over **179** BUSHINGS

shipped to transformer plants in Russian Federation

70-80%

MARKET



Russia and CIS high-voltage bushings share

Dmitry Abbakumov,
Deputy Commercial Director
Izolyator

Procurement is uniquely important part of the work of any enterprise. In fact, the main task of "buyers" of an industrial enterprise is to find and deliver high-quality materials and components at minimum prices which allows the manufactured products of the enterprise to remain competitive.

Specialists working in this direction not only track whether products are delivered on time and meet technical requirements, but constantly strive to cut cost spent on the purchase of materials, components and services. All these operations are impossible without careful coordination of the activities of supply chain participants in order to provide added value for consumers.

Our goal is to ensure that the necessary materials and components for the production of high-voltage bushings are delivered as scheduled, regardless of any force majeure circumstances. And we especially appreciate partners who share our beliefs, and are constantly working to improve our relationships.

Foundation for development

Head of Electrical Porcelain Dpt at Global Insulator Group Sergey Kalashnikov at the assembly shop of Izolyator

In May 2019 Izolyator was visited by Head of Electrical Porcelain Department at Global Insulator Group Sergey Kalashnikov. Izolyator was represented by the deputy commercial director Dmitry Abbakumov.

At the talks, parties discussed the possibilities of Global Insulator Group for the production and supply of porcelain housing in the required volume (components for manufacturing Izolyator high-voltage bushings). During the tour of the enterprise, the guest was shown the main stages of the technological cycle of production of high-voltage bushings with solid internal RIP and RIN insulation. As a result of the visit parties agreed on the plan of development of business relations between the two companies in the nearest future. ■

Discussing business aspects

Participants of the business visit of Kamyshlov plant Uralizolyator's management representatives to Izolyator

Izolyator was visited by representatives of the management of the Kamyshlov Plant Uralizolyator managing director Alexander Frantsuzov and deputy managing director Yevgeny Safonov. Our side was represented by Deputy Commercial Director Dmitry Abbakumov and Head of Purchasing Vladimir Romanov.

Companies discussed production and commercial aspects of joint activities, agreed technical requirements for porcelain housing «Uralizolyator» and order volume.

The guests got acquainted with the technological process of high-voltage bushings manufacturing, in which components of produced by Kamyshlovsky plant Uralizolyator are being successfully used. Following the visit, the parties clarified a joint work plan for the nearest future and outlined measures for the further development of mutually beneficial cooperation. ■

Representatives of the Indian company Modern Insulators Ltd. at the presentation of the Izolyator Company and its products

Introduction of century-old history and cutting edge technology

Izolyator was visited by representatives of the Indian electrical company Modern Insulators Ltd. MIL was represented by: Vice President (Marketing) Shailendra Jhalani, B. E. in Electrical ENGG / Manager (Marketing) Devendra Sharma, General Director of Energo Profit Company — the official representative of MIL in Russian Federation — Alexey Saidaliev

Izolyator was represented by: Deputy Commercial Director Dmitry Abbakumov, Lead Technical Support Viktor Kiryukhin, Procurement Manager Antonina Maslennikova.

The meeting was started with the presentation of the Izolyator plant and its century-long history, the product range and new developments in the field of high-voltage bushings with solid internal insulation. Further, the projected volume of porcelain housing supplies for 2019 and further prospects for cooperation between the two companies were discussed in detail.

Upon the meeting end, a tour of the production facility took place, during which the guests got acquainted with design and modern technologies of testing and production of high-voltage bushings with solid internal RIP and RIN insulation. ■

Today and Tomorrow

Working meeting at Izolyator plant, L-R: Vladimir Romanov, Dmitry Abbakumov, and Head of business development of MPK Plant, Sergey Sirenko

Izolyator was visited by Sergey Sirenko, head of business development of MPK Plant.

The guest was welcomed by Deputy Commercial Director Dmitry Abbakumov and Head of Purchasing Vladimir Romanov. At the meeting, parties specified the list and planned volumes of supply of components for production of Izolyator high-voltage bushings.

Promising large-scale joint projects were also discussed.

The MPK plant is a part of the largest Russian manufacturer of automotive components — the AvtoKom industrial group. It was founded in 2009 as a joint venture between Avtokom Russia and CIE Automotive Spain. It specializes in the production of parts using the technology of machining, casting plastics, welding, stamping, electroplating. ■

Following a uniform strategy

Izolyator was visited by representatives of the management of the company Industrial Support Alpha-Metal — Deputy General Director Valentin Borunov and Production Director Alexei Bushin.

Izolyator was represented by: Dmitry Abbakumov, Deputy Commercial Director; Vladimir Romanov, Head of Procurement; Head of the machine shop, Mikhail Sheremetyev.

Parties discussed various aspects of the development of cooperation between the two companies: technical requirements to components of Izolyator high-voltage bushings, order volume, possible expansion of product sales line-up taking into account Izolyator new developments.

The guests visited the machine shop, in which metal parts of high-voltage bushings are manufactured and processed. Following the meeting, the parties clarified a unified strategy for the development of long-term and mutually beneficial cooperation, and also outlined the primary measures to improve efficiency in the process of daily interaction between the two enterprises. ■

Representatives of the management of PO Alpha-Metal at Izolyator

54 | Awarding best employees on the day of 123rd anniversary of the enterprise

◀ Employees of Izolyator, awarded with the Medal «For many years of diligent work» on the occasion of the 123th anniversary of the enterprise

▶ Olga Deshina is awarded for 35 years of conscientious work at Izolyator

◀ Elena Posokh is awarded for 10 years of conscientious work at Izolyator

◀ Igor Nikitin is awarded for 25 years of conscientious work at Izolyator

▶ Leonid Hromov is awarded for 20 years of conscientious work at Izolyator

▲ Gennady Rybakov is awarded for 20 years of conscientious work at Izolyator

▼ Elena Zubakova is awarded for 30 years of conscientious work at Izolyator

To remember

A minute of silence in memory of the Izolyator factory workers - front-line soldiers and workers during the Great Patriotic War

Placing of flowers at the monument to Izolyator workers - to soldiers and workers of the rear of the Great Patriotic War

On the eve of Victory Day, Izolyator held an annual solemn ceremony dedicated to the memory of the factory's workers — front-line soldiers and workers of the rear of the Great Patriotic War. The management and employees of Izolyator laid flowers at the monument on the enterprise's territory and honored the defenders of the Fatherland with a minute of silence.

From the first days of World War II, the Izolyator plant team began to restructure all of its activities on a military basis, subjecting it to strengthening the defense, fulfilling government tasks for the production of both its main products and everything needed for the front by order of the defense industry.

Many factory workers volunteered to join the Red Army. The Executive Committee of the Moscow City Council of Workers' Deputies awarded the staff of the Izolyator plant with a certificate of honor for high patriotism in the formation of the people's militia and the heroism and courage displayed in battles defending our Fatherland.

Employees of the Izolyator company sacredly commemorate all the factory workers who forged the Victory at the front and in the rear. Their names are carved on the granite slabs of the memorial forever.

On this bright day, we bow our heads before the memory of the departed, and with all our heart we thank all the war and labor veterans living among us. ■

Happy Birthday!

On May 17, 2019, the anniversary of Nelya Efimovna Barkova, wife and associate of Alexander Alexandrovich Barkov — the legendary director of the Izolyator plant from 1964 to 1989 was held in the Izolyator company.

From the very beginning of her career at Izolyator, Nelya Efimovna showed herself to be a disciplined and involved worker, performing her work with the highest responsibility and quality. Many considered and to this day consider her to be their teacher, wise mentor and the most worthy role model.

Only in 2008, Nelya Efimovna decided to retire, but she could not live out of touch with beloved enterprise. Even today, she is conducting a lot of social work with veterans of the plant, giving them the opportunity to be aware of their involvement and be proud of the labor contribution to today's successes and achievements of Izolyator. About all this and many other things said former colleagues who gathered to honor the dear hero of the day.

Viktor Kiryukhin, Deputy Chief Designer, thanked Nelya Efimovna for the desire and ability to help people in all situations

Ekaterina Kupkina, leading porcelain expert up till 2018, who started her career under the supervision of Nelya Efimovna,

Alexander Slavinsky, Chief Executive Officer of Zavod 'Izolyator' LLC, proclaims kind words of gratitude and honor to Nelya Efimovna Barkova.

made her speech in a really heart-touching manner:

"An exceptionally sensitive, attentive, sympathetic and modest person. The very embodiment of spiritual warmth and kind support, inspiring all those around", — Is the unanimous opinion of all whose life course has ever intersected with this amazing person — Nelya Efimovna.

Nelya Efimovna visited the historical part of the Izolyator museum. In many events presented in the exhibition, she took the most direct and active part. After the official part, Nelya Efimovna walked through the workshops, with which her whole life is connected.

The whole team of Izolyator from the bottom of their hearts wishes Nelya Efimovna good health, energetic, long and fulfilling life, love and support of all who are near! We are always looking forward to Nelya Efimovna Barkova visit to the enterprise; our doors are hospitably open for her at any time! ■

In the 2nd quarter of 2019 **85** Izolyator employees attended workshops or trainings improving their skills

Great opportunity for the students to learn the real process

Izolyator held an excursion lesson for students of High Voltage Engineering and Electrical Physics Department (TEVN) of the Institute of Electrical Power Engineering of National Research University MPEI. The excursion classes were jointly arranged by TEVN and the Izolyator plant, which provided financial support.

The event was attended by more than 30 students of 2 and 3 courses, accompanied by professors of TEVN.

In accordance with the purpose of the lesson, Head of the Izolyator Test Center Dmitry Ivanov, Lead Technical Support specialist Viktor Kiryukhin, and Head of SVN-Service Dmitry Mashinistov, conducted an excursion around the enterprise and presented the main technological stages of production and testing of modern high-voltage bushings to students. Excursion lesson at Izolyator was held in an atmosphere of active interest and with great benefit for students. We appreciate the Department TEVN of MPEI for active cooperation! ■

Students of the Moscow Power Engineering Institute attend a lecture at Izolyator

Izolyator - for schoolchildren

In June 2019, a plant tour for students of school No.1502 by the Moscow Power Engineering Institute took place at Izolyator. The tour went as the engineering vacations activity, organized for the schoolchildren at the Moscow Power Engineering Institute having engaged over 25 high school students and their teachers.

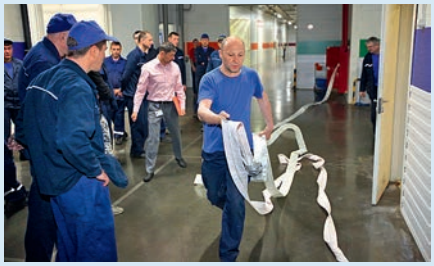
The introduction to the company history began with a welcome address of the General Director of the manufacturing plant of Izolyator Sergey Moisseev. The students learned about the century-long history of the enterprise, its products and newest development, successful cooperation with the world's largest energy companies and leading power equipment OEMs.

Lead Technical Support Specialist Victor Kiryukhin gave a plant tour to the students and familiarized the students with key production and testing stages of modern high-voltage bushings.

The tour at Izolyator went in an atmosphere of keen interest and was of a great use for the students. ■

Victor Kiryukhin is familiarizing the students of School No.1502 by the Moscow Power Engineering Institute with the main stages of production and testing of high-voltage bushings

Safety: Always. Anywhere



At the site of welding «fire is detected»

A prescheduled practical fire safety exercise was held at Izolyator plant. A lesson on the topic "Personnel Actions in the event of a Fire" was given by Assistant General Director for Safety at Izolyator Boris Sobelman with the involvement of the forces and means of the Planet 101 Private Fire Department.

According to the plan, the lesson was held in two stages. At the first stage, the actions of the workers of the welding section of the machine shop were tested when electric equipment ignited inside the building. At the second stage, the evacuation of the personnel of the enterprise on the signal of the automatic fire warning system was conducted as well as skills in the use of fire extinguishers were worked out. ■

58 | Clean-up at the cultural heritage site in Pavlovskaya Sloboda

▼ Employees of the Izolyator plant are participants of subbotnik at the territory of the cultural heritage object - the former cloth factory of Count P.I. Yaguzhinsky in Pavlovskaya Sloboda

On May 18, 2019, Izolyator employees took an active part in the clean-up day at the «Pavlovskaya Cloth Factory, barracks of the grenadier artillery brigade», which is the territory of the cultural heritage site dating back to the first quarter of the 19th century and early 20th century (Cloth Factory of Count P.I.Yaguzhinsky).

The event was arranged by the Public Chamber of the Istra City District with the support of the Istra City District Administration.

More than 200 people took part in the clean-up: Minister of Investments and Innovations of the Moscow Region Mikhail An, head of the Istra city district Andrei Vikharev, representatives of the Istra and Pavlo-Slobodsky municipal administrations, public utilities organizations and other proactive residents of Pavlovskaya Sloboda.

In the abandoned, overgrown territory, activists cut down shrubs, cleaned fallen trees, dead wood and debris.

We appreciate all participants of the clean-up for supporting the historic cultural heritage of our region! ■

▲ Rock and Roll !

▼ Great power of enthusiasm

◀ Impressive performance

▶ Come on!
Friendly team works
as one

◀ Young participants of the labor day

60 | Volleyball Tournament, dedicated to the 123rd Anniversary of the company

◀ Intricate combination

▶ Rapid Attack

▼ Awards await their owners

▲ Individual skills - to perfection

▶ Air-run to victory

▼ Ball magic

62 | Volleyball tournament award ceremony

◀ Select Team is the winner of the volleyball tournament

▶ Team «Directorate» – an honorable second place

◀ The never-discouraged "Commerce" team is third today

The team All Together from Istra town of the Moscow region – a participant in hockey Union Cup "We" tournament among large families

Supporting family sport

Izolyator supported a hockey charity tournament among large families — Union Cup "We" — and the team All together from Istra town of the Moscow region.

The Odintsovo Armada Ice Palace for the first time became the venue of the zonal stage of this family tournament. The objectives of the tournament is to strengthen family values and improve the efficiency of communication between parents and children through joint sports activities.

The tournament of large families united amateur hockey teams of the Moscow region from Odintsovo, Krasnoznamensk, Kubinka and Istra. The team includes fathers and children from large families.

The solemn opening was attended by the General Director of Izolyator Sergey Moiseev. With a score of 4-2, the All Together team of the Istra city district took bronze in the qualifying round of the regional family hockey tournament. On the first day, the team lost to Kubinka, but the next day, they beat Krasnoznamensk!

Sergey Moiseev at the hockey charity tournament among large families – Union Cup "We", held in the town of Odintsovo, Moscow region

In the game for the Union Cup "We" among large families - the team All Together from Istra, Moscow region

Passions are not inferior to professional hockey tournaments. Everyone was aiming for victory! All teams were worthy of reaching the final, and this time the places were distributed as follows:

1st place — Odinets, Odintsovo;
2nd place — Kubinka;
3rd place — "All together", Istra;
4th place — Krasnoznamensk.

Thanks to all the families that took part in the hockey tournament! ■

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.

Balıkesir 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, cicuit 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 an global compation 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, ie. 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 Dnestrenergo) 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 accross 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 producton 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 Elektrozavod) 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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10 -11 SEPTEMBER 2019 MOSCOW

APPLIED SCIENCE CONFERENCE
"Production, operation, diagnostics and maintenance of high-voltage bushings and measuring transformers. Requirements to transformer oil for high-voltage equipment"

CIVIC COUNCL OF SPECIALISTS
on diagnostics of power electrical equipment
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National Study Committee D1
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Materials and Emerging
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