To stay ahead of the curve, keeping adherence to traditions

For more than 120 years of its history, Izolyator plant has produced more than 620 000 high-voltage bushings, operating in the vast majority of power facilities in Russia and the CIS countries, as well as in 30 countries of the world. Due to active research and development activities, continuous expansion of international relations both in business and in engineering direction, the company is constantly improving its products, offering perfect innovative solutions, which provide the highest level of reliability.

INNOVATIVE DEVELOPMENTS

The range of products manufactured by the company includes over 360 high-voltage bushings (including its versions) of various types and voltage classes. In total, about 32 new bushing designs were developed within the past 2018. Among them there were innovative products not previously produced in Russia.

Since 2018, Russian power grids have set a course for the transfer of all major technological processes to a new digital platform. Supporting the implementation of power grid digitalization concept, Izolyator started the development of a new bushings line containing additional power sources for connecting digital diagnostic equipment. Such an option will undoubtedly be in demand in the near future when retrofitting power transformers and old circuit breakers without inbuilt diagnostic tools.

Design and construction of new modern digital substations required new types of high-voltage equipment, which includes high-voltage bushings. The best option for solving tasks of digital substations was to implement a new type of bushings with solid insulation like RIN (Resin Impregnated Nonwoven).

RIN is a resin-impregnated nonwoven synthetic material. This innovative in all senses component allows engineers to create new-generation high-voltage bushings. Eliminating paper from solid bushing insulation significantly increases its moisture resistance. In addition, requirements for bushings storage are considerably reduced.

The technology of RIN-insulation manufacturing is almost identical to the RIP-technology. However, RIN-insulation properties make it possible to eliminate long and energy-intensive operation of thermal vacuum drying. Besides, the impregnation process leaves no voids in the insulation material due to the chemical reaction of synthetic yarn and epoxy resin. It ensures the absence of partial discharges inside the insulation up to the maximum operating voltage.

The resulting insulation material has the highest hydrophobic properties. Due to this, dielectric loss coefficient is stable and not dependent on the effects of very high humidity. It ensures transportability, absence of special storage requirements, and reliable operation of the insulation.

Digital substations are designed to ensure minimal equipment maintenance in operation. If something happens, it is necessary to replace failed equipment as easily as a blown fuse. Bushings with internal RIN insulation and external polymer insulation serve these purposes. When damaging such a bushing, there are no damages for adjacent equipment and bushings of adjacent electrical phases. In this case, it is

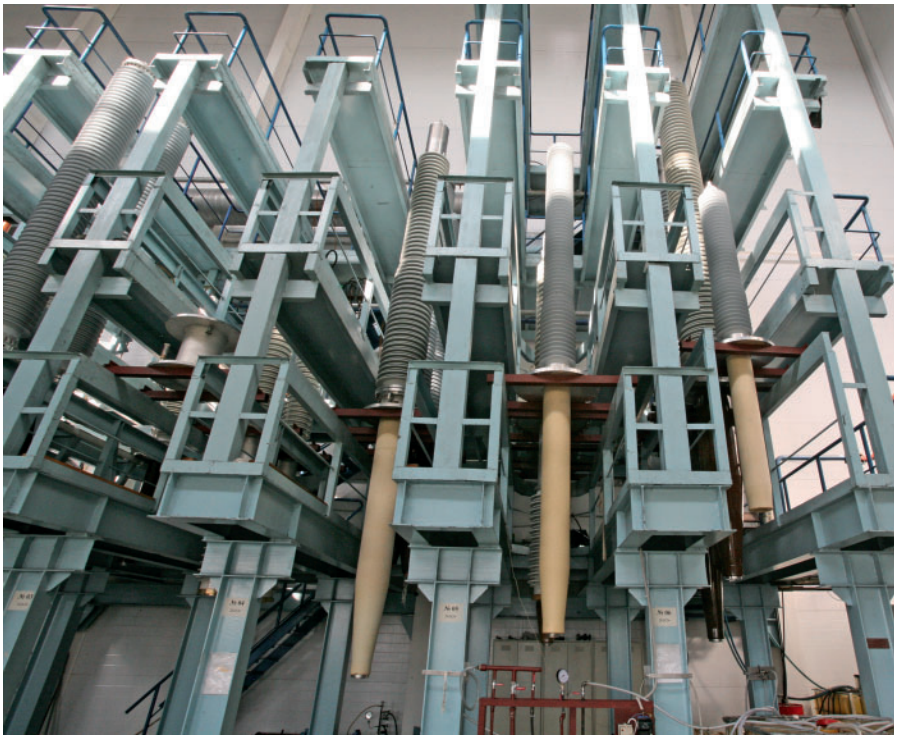
enough to replace the bushing for further electric power supply of consumers.

Bushings with RIN insulation are certified in GOST RF state certification system. The certificates of the Federal Agency on Technical Regulating and Metrology are obtained. At present, the certification procedure in PJSC "Rosseti" is ending.

It should also be noted that RIN insulation has high thermal conductivity and a low coefficient of thermal expansion. It helps to decrease voltage between mechanically connected elements of the bushing. This is important for operation at extreme temperatures (both high and low). Also, such properties of RIN insulation open up possibilities for creating equipment using superconductivity phenomenon.

In such equipment, the bushings must operate reliably at ultra-low temperatures. At the same time, the lower part of the bushings should constantly work in liquid nitrogen at a temperature of minus 196ºC, and the upper part — at ambient temperature.

Conducted studies have shown that RIN-insulation, using synthetic nonwoven material, makes it possible to produce bushings enabled to withstand all the specified electrical and mechanical loads in extreme working conditions (under extreme temperatures). As a result, Izolyator plant developed and manufactured 110 and 220 kV bushings, which passed all acceptance tests. Today, Izolyator plant is the only manufacturer of high-voltage bushings in the world that has successfully conducted acceptance tests of 110 and 220 kV bushings, the lower parts of which were in liquid nitrogen at a temperature of minus 196ºC.



Bushings with RIN insulation in the assembly room of Izolyator plant

Such high-voltage bushings produced by Izolyator plant proved their high reliability and quality in the project of SuperOX company for creating 220 kV three-phase current-limiting device based on high temperature super conductivity. The equipment was installed at Moscow "Mnevniki" substation in 2018. Following the results of the work done, the company plans to initiate a standard for the use of cryogenic equipment in power industry.

Foreign orders pose new challenges to the company, related to the change of product design, the search for technical solutions and non-standard approaches when manufacturing process. Many new engineering solutions of Izolyator plant appear due to foreign orders.

In response to world technological challenges and requests from foreign customers, Izolyator plant developed and launched into serial production a line of DC bushings for long-distance transmission lines. To date, complete documentation has been prepared for the production of high-voltage DC bushings. In addition, plant's test center has been equipped with the necessary equipment. Thus, high-quality domestic bushings for future Russian

New equipment for manufacturing external polymer insulation of bushings at Izolyator plant

The first phase of 220 kV superconducting current limiter, equipped with bushings produced by Izolyator plant in the KER test center

long-distance DC transmission lines already exist.

INTEGRATION COOPERATION

In the past and present, and well into the future international cooperation is an important part of Izolyator Company operation and development. At the same time, the company especially appreciates the opportunity to prove the reliability and efficiency of developed technologies, materials and equipment through one of the most difficult checks — the test of time. Due to this, Izolyator Company constantly opens up new regions of presence worldwide, establishing long-term and effective partnerships.

In 2018, the company significantly strengthened its relations with long-standing and reliable partners from the CIS countries — power grid companies and energy equipment manufacturers from Armenia, Moldova, Tajikistan, Kazakhstan, Belarus, Ukraine, Uzbekistan and Georgia. Izolyator Company has found reliable partners in European and Asian countries and has contributed to the strengthening of relations between the national energy systems of Russia, Vietnam and India.

The agreement on joint manufacturing facility establishment between Mehru and Izolyator was signed during the 47th CIGRE Session in Paris. From left to right: Andrey Murov, Chairman of the Management Board of "FGC UES", PJSC; I. S. Jha, Chairman of Power Grid; Sandeep Prakash Sharma, Executive Director of Mehru; Alexander Slavinsky, Chief Executive Officer of Izolyator Plant LLC

An important milestone in the development of the international relations of Izolyator Company and entire domestic electrical industry was the signing of a strategic memorandum with the Indian company Mehru Electrical & Mechanical Engineers (P) Ltd on the establishment of a joint manufacturing facility within the 47th CIGRE Session.

Participants of bushing tests for Indian companies TSTRANSCO and TTDI in the test center of Izolyator Plant

The signing ceremony of the Agreement was held at the booth of Russian National Committee of CIGRE (RNC CIGRE) in the presence of Andrey Murov, Chairman of the Management Board of "FGC UES", PJSC and Chairman of RNC CIGRE, and Mr. Jha, Chairman and Managing Director of Power Grid Corporation of India Limited and Chairman of CIGRE Indian NC.

The agreement establishes the principles of organizing the complete production cycle and further realization of high-voltage bushings of various voltage classes with modern solid RIP insulation in India. The main constructive part, as well as the know-how of the joint manufacturing facility will be the internal RIP-isolation — Izolyator company in-house development. It should be noted that this is the first experience of Russian companies in creating a joint manufacturing facility for the production of high-voltage electric power equipment with Indian companies.

Mutually beneficial cooperation of Izolyator and Mehru will allow the companies to reduce production and transport costs and to optimize the logistics of ultimate product delivery to the customer. Much attention will be paid to the maintenance of products both in the processes of its installation and operation through the use of developed service and distribution network of the Indian partner.

Izolyator Company plans to conduct a full range of high-voltage bushings tests at the Central Power Research Institute in India in April 2019.

The type test program includes a full cycle of electrical, current and special seismic tests of 420 kV / 3000 A and 800 kV / 2000 A bushings. The most interesting and unparalleled anywhere in the world stage of future international event will be seismic resistance test of 800 kV / 2000 A bushing.

The main part of the event will include an open technical conference for discussing all aspects and technical features of operation, installation and maintenance of ultrahigh-voltage bushings with RIP-insulation made by Izolyator Company for Indian power facilities.

Due to the expansion of international cooperation areas, Izolyator Company has the opportunity to manufacture products that are competitive not only in the Indian market, but also in the markets of Southeast Asia, including China, and in other regions of the world. In the near future, the company will have good prospects in the Middle East. The first steps of cooperation with Turkey have already been taken. In addition, cooperation with Syria is starting and collaborative work with such a long-time partner as Iran Transfo company is continuing.

Alexander Slavinsky, D. Sc., Chief Executive Officer of Izolyator Plant LLC emphasizes that the company's staff is always ready to share unique accumulated experience with all partners. Sharing of experience is an integral part of the mission to create the foundations for a stable and sustainable energy supply in the world.

Today, the company sets new global challenges. For Izolyator plant it has already become a good tradition to please consumers with new materials and technologies every year. In 2019 the export volume will be further increased, and "Made in Russia" brand will be brought to a new global level. P