



LEAD STORY

Composites for Nuclear Plants and Wind Turbines

Rosatom is examining opportunities of using composite materials in nuclear power plants and wind turbines.

Last week Moscow hosted the 5th Composites without Borders Forum where Russian and international businesses discussed major trends in the global composite industry. The forum was organized by UMATEX Group (Rosatom) in association with the Union of Composite Material Manufacturers under the auspices of the Russian Ministry of Industry and Trade and was attended by more than 500 people.

Addressing the plenary session entitled 'Russian Composites – Breakthrough Solutions and Materials Today and Tomorrow', Rosatom's First Deputy CEO

for Corporate Development and International Business Kirill Komarov spoke about the corporate strategy in developing new businesses, including composite materials. Rosatom is a long-standing manufacturer of carbon fiber in Russia. Argon, one of its oldest carbon fiber manufacturing subsidiaries, was commissioned in the 1970s. Another plant was put in operation in 2015. Alabuga-Volokno is capable of producing over 1,400 tons of carbon fiber per year. This is far more than enough to satisfy the Russian market, which has a size of just 300 tons per year. Products of the new plant meet international standards and are exported to many countries.

For wind and nuclear

According to Kirill Komarov, Rosatom plans to use composite materials in nuclear plant construction projects. Components that can be made of composite materials include road

surfaces, lighting posts, pre-fabricated bridges, composite reinforcement fiber and bars for concrete structures, fencing, high-pressure vessels, and pipelines.

Composite materials will also be used in wind turbines. Rosatom plans to establish local production of composite turbine blades with carbon fiber stiffening ribs, and make nacelle housings of composite materials.

How to expand the market

Development of the composite material market is a task of UMATEX Group, one of Rosatom's subsidiaries. It is Russia's largest and Top 10 global producer of carbon fiber products. Alexander Tyunin, CEO of UMATEX Group, told the Forum how to scale up the carbon fiber market from 300 tons in 2017 to 3,000 tons in 2025. He mentioned four priority areas

that will contribute to a tenfold market growth. Local production of wind turbine blades will alone consume 500 tons of carbon fiber per year. Production of Generation IV pressure vessels will require 700 tons of carbon fiber every year. Sports equipment might add another 400 tons to the annual consumption of carbon fiber.

According to him, the construction industry needs about 500 tons of composite materials every year. He also thinks that cooperation between domestic manufacturers of carbon fiber will give momentum to the composite industry. For this purpose, UMATEX Group is working to create a composite material cluster that will bring together production facilities in the Republic of Tatarstan, Moscow Region and Saratov Region.

IN FOCUS

Good Prospects

Rosatom Is Ready to Continue Cooperation with Bulgaria on Belene NPP Project.

This was announced by Vadim Titov, Head of Rosatom Central Europe, speaking at the conference on Bulgarian nuclear energy, the Bulgarian National Radio reports. Bulgarian Prime Minister Boyko Borisov and a representative of Rosatom are said to have had a meeting in October. As the representative of the Russian company said, Rosatom and Bulgaria made a series of agreements related to the Kozloduy Nuclear Power Plant. Some of them pertain to nuclear fuel supplies and service life extension at Units 5 and 6 of the country's only operating nuclear plant. Taking into account long-standing cooperation in the nuclear industry, the Russian nuclear corporation is also prepared to take part



in the Belene project, Titov said. He also noted during the conference that nuclear power had good prospects in the future. Development of green energy and renewable energy sources without nuclear energy does not mean higher efficiency, but extra costs for consumers, he noted.

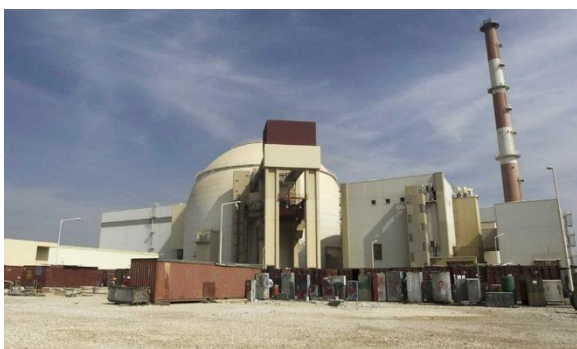
Titov believes though that renewable sources should not be totally excluded from the energy mix. "The share of renewable – wind and solar – power sources should not exceed 40% otherwise

the power supply in the country turns unreliable,” he explained.

Earlier in October, Bulgarian Energy Minister Temenuzhka Petkova said that the country would like to continue its cooperation with Moscow on the Belene construction project. At present, Bulgaria examines all available opportunities of using the machines and equipment manufactured for the mothballed project and does not exclude acquiring Rosatom as a project investor, Petkova said. She

added that no talks had been held to discuss these opportunities, and Bulgaria would continue its consultations with Moscow until the year end. Later Petar Iliev, Executive Director of NEK EAD (National Electric Company of Bulgaria), told the media that the company was holding talks with Rosatom on the possibility of storing the reactor vessels (manufactured by AtomStroyExport) on the Belene site under the manufacturer’s control. Until now, the future of Belene remains undefined.

COOPERATION



Russia, Iran Declare Commitment to JCPOA

Rosatom and Russia’s Ministry of Foreign Affairs held a joint workshop dedicated to the 25th anniversary of the Russian-Iranian civil nuclear cooperation.

The workshop entitled “25 Years of Cooperation between Russia and Iran in Peaceful Uses of Nuclear Energy: New Prospects under the Joint Comprehensive Plan of Action, Annex III” was held in association with the Atomic Energy Organization of Iran (AEOI).

The attendees exchanged their views on the role of the Joint Comprehensive Plan of Action (JCPOA) in ensuring Iran’s predictable and stable civil nuclear cooperation with Russia and other countries in the areas specified in JCPOA’s

Annex III providing for a wide range of areas for joint initiatives with Iran. The workshop brought together representatives of all the signatories to JCPOA, including EU and IAEA member states.

It was stressed at the workshop that both Russia and Iran were committed to JCPOA and considered it to be a well-balanced operational document made in the best interests of all the parties involved in its development and adoption.

On the second day of the workshop, Iranian experts and other participants had a chance to become acquainted with the activities of Rosatom’s Technical Academy and the Russian Research Institute of Radiology and Agricultural Ecology in Obninsk (Kaluga Region, Russia). The workshop has demonstrated that the existing bilateral cooperation based on mutual trust and respect between Russia and Iran is a good basis for further development of joint civil nuclear initiatives between the countries.

The nuclear power plant in Bushehr is a central point of the nuclear cooperation between Russia and Iran. Rosatom has built the facility’s Unit 1 and continues building other units. On 10 September

2016, a groundbreaking ceremony was held to mark the start of construction of Bushehr Units 2 and 3. As Valery Limarenko, CEO of ASE Group, said at the IAEA General Conference in September this year, ASE has already started working on the construction of these two units. He said the construction team had begun preparing the entire site for the new power facilities and intended to start excavating the foundation pit for Unit 2. The contract for the construction of two new power units at Bushehr was signed by Russia and Iran in November 2014. Units 2 and 3 will be based on the Russian-designed VVER-1000 reactors meeting the most stringent post-Fukushima safety requirements. Bushehr II has been designed by AtomEnergoproekt, with AtomStroyExport acting as the general contractor (both companies belong to ASE Group).

FOR REFERENCE

The nuclear power plant in Bushehr is a facility without peer on the global scale. Rosatom managed to integrate Russian equipment into the German structural design and use nearly 12,000 tons of German equipment. Designers had to conceive, develop and apply a number of unique technical solutions to adapt the Russian technologies to the existing on-site structures. For example, core equipment of the nuclear island and the turbine were manufactured in Russia, while the building itself was designed by German companies. The nuclear island had to be redesigned to allow for the installation of a Russian-designed VVER reactor. The turbine was also redesigned to be mounted in the turbine island designed and built by Kraftwerk Union AG.

CONSTRUCTION



Nuclear Construction Going Full Tilt

Work on the nuclear construction sites in Russia is going full tilt. Leningrad II and Rostov NPP are preparing to go critical soon. You will find more news from Russia's nuclear plant sites in our report.

The first VVER-1200 unit of Leningrad Nuclear Power Plant II passed another milestone as the Russian Federal Service for Environmental, Technological and Nuclear Supervision (Rostechнадзор) started a comprehensive technical audit and inspection of the unit. It will take two weeks and aims to confirm that the unit is ready to achieve criticality. Specific attention will be paid to the plant's personnel and qualification of the employees.

Following the audit, Rostechнадзор will express its opinion on the unit's readiness for the reactor startup when fresh nuclear fuel assemblies will be loaded into the core of the most powerful reactor of Leningrad II. The first VVER-1200 unit of Leningrad II is scheduled to go critical in 2017.

Rostov NPP

Dummy assemblies are being unloaded from the reactor of Rostov Unit 4. These are assemblies that are used instead of standard fuel assemblies during the commissioning period until the regulator issues a fuel loading permit. Dummy assemblies have absolutely the same design, size and weight, and are made of the same material (except for nuclear fuel) as standard fuel assemblies.

Engineers working on site are checking all the components and electric systems of the nuclear island. Checks of the primary and secondary circuit equipment follow the established plan of preparing Unit 4 to going critical. "The audit of equipment will allow us to conclude whether the reactor can go critical, that is whether we can load nuclear fuel into the reactor core," said Oleg Vysotsky who is in charge of the nuclear island at Unit 4. The audit and inspection started on 17 October and will take 25 days. Rostov Unit 4 is scheduled to go critical in 2017.

Novovoronezh II

Pre-stressing operations on the internal containment structures were completed at Unit 2 of Novovoronezh Nuclear Plant II. This important stage was finished two weeks faster than the same operations at Novovoronezh II Unit 1 a year before. At present, the condition of reinforced concrete structures is being monitored with automatic sensors. Monitoring

results will be used to make a conclusion whether the containment building is ready for pressure and air tightness tests. The second unit of Novovoronezh II is based on a VVER-1200 reactor and complies with post-Fukushima requirements set out by the IAEA. The unit will be put in operation in 2019.

Kursk II

The work is ongoing at the site of Kursk Nuclear Power Plant II. The first geotechnical surveys were completed on the sand and gravel base of the plant's Unit 1. Two out of four scheduled surveys confirmed its reliability. The other surveys are in process of checking density and dimensional stability of the base. "The soil base for Unit 1 should be completed on 23 October. This enables us to start a new construction phase – reinforcement of the foundation slab for the reactor building of Unit 1 – in December 2017," the director for the construction of Kursk NPP-2 Nikolay Mitrofanov said. Foundation concreting is planned to begin in the spring of 2018. Kursk II is designed to replace the existing Kursk Nuclear Power Plant that will be taken out of operation in the years to come. Its first two units with VVER-TOI, a new-type reactor, will be commissioned simultaneously with decommissioning of Units 1 and 2 of the existing nuclear plant.

IN BRIEF

Rosatom Ready to Export Security Systems

Rosatom made a decision to export site security systems to the countries where the company builds its nuclear plants. This was announced by Rosatom's Deputy

CEO Nikolai Spassky at last week's international conference on nuclear non-proliferation hosted by Moscow. "The global situation is – to put it mildly – very unquiet. This is the reason why we made a very serious decision this year to address numerous requests of our customers. We are ready to provide consistent support to the countries where

we build nuclear plants by means of installing security equipment,” Mr. Spassky said. According to him, it is the country where the nuclear plant is located that is ultimately responsible for maintaining on-site security and operation of security systems. “There should be no confusion on this point, but we are ready to provide technical solutions and equipment. Believe it or not, it was a really difficult decision for us, because it had to do with very sensitive information, often on the verge of state secrets. Nevertheless, we decided to do so, because it is vital and critical,” Mr. Spassky concluded.

Vessel for Belarus Unit 2 Delivered

A reactor vessel for Unit 2 was delivered to the site of the Belarus Nuclear Power Plant. The 330-ton 13-meter long and 4.5-meter wide vessel is undergoing the incoming inspection process.

“Transportation of any cargo of that size is always a very difficult task in terms of logistics, and it takes much time,” said Andrei Loginov, Belarus NPP Project Manager from ASE. “The transportation process was monitored by Russian and Belarusian experts from the very beginning,” he added. The complexity class of the delivered component requires checks to be performed at every production stage, from purchasing steel to shipping the finished piece. The total quality assurance program for reactor vessels includes more than 300 checks involving representatives of the customer, general contractor and regulator. More tests are performed during the manufacturing process, including hydrostatic tests and dimensional stability tests, as part of the quality assurance procedure. After the reactor vessel passes incoming acceptance tests, it will be placed in its permanent position in the reactor pit of Belarus NPP Unit 2.