Fifteen years of flying high

Flight Control Centre of Belarusian system of Earth remote sensing continues its work, located within the NAS' United Institute of Informatics Problems

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Antenna of Belarusian space satellite

By Vladimir Yakovlev

Visiting the National Academy of Sciences' Flight Control System, I arrive just as a communication session with the Belarusian satellite is due to commence. Soaring over our planet at a height of over 520km, it shows as a red point on a huge wall-mounted monitor, moving on a parabolic orbit around the sphere of Earth.

This is its 12th orbit in 24 hours: one of 9,178 orbits to date. As we watch, the satellite crosses the Indian Ocean, then Asia and, at last, enters the visibility zone of the tracker station located in Belarus. This happens 2-3 times daily and again through the night. Radio communication channels begin to deliver data on the condition of systems within the satellite, and visual recordings from its flight.

The data is of growing interest to experts across various ministries and departments: agrarians and foresters, meteorologists and employees of the Ministry for Emergency Situations, as well as land managers. Russia also likes to receive our data, and shares that from its own satellite: Kanopus-B. Both transmit black-and-white images with resolution of up to 2m; the Belarusian satellite works as a pair with its Russian twin, doubling data volumes. The tandem was launched in 2012 via a Russian carrier rocket.

Union State space research programmes and a number of bilateral agreements guide the work of our satellites but Belarusian-Russian scientific and technical programmes have been in operation since 1999, when *Kosmos-BR* was adopted, 15 years ago. Under the aegis of the Belarusian NAS' United Institute of Informatics Problems, we have worked with Russian partners on three such joint projects. According to Belarus' CEO of Union Programmes, Sergey Korenyako, by the end of last year, a fourth programme had begun: *Monitoring-SG*, lasting until 2017.

Mr. Korenyako tells us, "Firstly, we are designing equipment for terrestrial testing of space systems and components. This is vital, to ensure greater reliability and lifespan for satellites and carrier rockets. The creation of high-resolution equipment for remote Earth sensing is also essential. Our latest radar systems will operate in all weathers and without sunlight. Our aim is to improve the quality of data received from the satellite, and the processing and transmission of this data to clients. Meanwhile, we are setting up a new training base for those working in the space sphere."

Sixty partners are participating in these tasks, including major organisations within Belarus' NAS and the Belarusian State University, and Roskosmos (Russian Federal Space Agency). Results are not yet announced, but there's no doubt that long-term Belarusian-Russian cooperation in the space sphere, built upon Soviet roots, will bear fruit.

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Inside the Flight Control Centre of the Belarusian space satellite

Partners find common interest

According to Bikesh Kurmangaliyeva, First Deputy Chair of the Board of the Kazakh ZERDE National ICT Holding, who took part in the International Forum on Telecommunications, Information and Banking Technologies *TIBO-2014*, Belarusian IT companies are potential providers of solutions and services for their country

Ms. Kurmangaliyeva noted that no one company is able to completely ensure the implementation of a large state project, so she believes interaction is important not only between companies, but also between states. ZERDE co-operates with Belarusian companies and is ready to continue this co-operation. "We are very interested in research in information and communication technologies. We could pursue joint research, particularly in the area of the Internet, cloud technologies and the application of data technologies in the state sector," she remarked.

In her opinion, now is the time for Belarus and Kazakhstan to work out a project to enable digital trade infrastructure. "I believe that our countries should co-operate in accomplishing this project because we are in the same customs space. We have reached an agreement with our Belarusian colleagues to work out a joint technical solution for digital trade and to legislate it," explained Ms. Kurmangaliyeva.

Kazakh companies are ready to share their experience of digital government development with Belarus. "We are ready to show our digital government to Belarusian colleagues from the inside and to share everything with them," added the representative of the Kazakh delegation.

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Energy-full wind finds place to go wild

By Yelena Semenova

Wind farm under construction in Smorgon District, with other sites allocated in two of Grodno Region's districts

The two first wind turbines (each about 60m high) have recently been launched in the Smorgon District, near the village of Krevo to generate energy for the district. The alternative energy project was realised by Aero Stream JSC, which has initiated wind farm construction in the area. Twenty five sites in the Smorgon District are considered suitable for the generation of wind power energy.

Stronger and cheaper — locally invented new flame resistant fabric

By Dmitry Patolichev

The lighter clicked, and the demonstration began. The tongue of flame played under the piece of fabric held in the speaker's hand. Several seconds passed, yet the fabric did not burn. However, after 10 seconds it started to smoke and it seemed to me that, perhaps, the experiment had failed.

But I was wrong. It seems that it was just the dye which had started to evaporate, and the smoke soon disappeared. Sure, the fabric faded slightly, but it easily survived the test of fire, whilst not losing its durability.

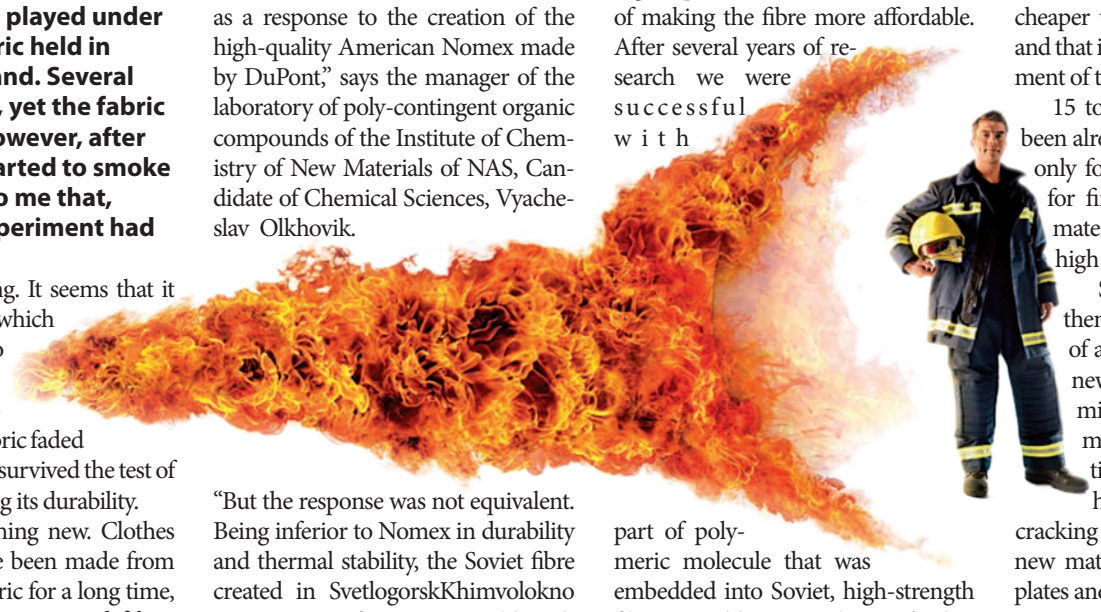
But this is nothing new. Clothes for firefighters have been made from non-flammable fabric for a long time, so why is the aforementioned fabric interesting?

This new, non-flammable fibre, which will rival the well-known aramids, was developed by Belarusian scientists and made in the Republic in an industrial way.

"High-strength polymer fibres were created in the USSR in 1970s as a response to the creation of the high-quality American Nomex made by DuPont," says the manager of the laboratory of poly-contingent organic compounds of the Institute of Chemistry of New Materials of NAS, Candidate of Chemical Sciences, Vyacheslav Olkhovik.

"But the response was not equivalent. Being inferior to Nomex in durability and thermal stability, the Soviet fibre created in SvetlogorskKhimvolokno JSC, was not fire-resistant, although did not cause burning. Therefore in situations where high temperature and open flame resistant fabric was required, the imported fibre was used, which was a very expensive option, even by Western standards.

We set ourselves the task of solving the problem and, at the same time, of making the fibre more affordable. After several years of research we were successful with



part of polymeric molecule that was embedded into Soviet, high-strength fibre. In addition to that, a further component used in the reduction of burning was also used. Thus, there appeared a domestic equivalent of Nomex. It appeared to have the same fire-resistance, whilst surpassing the original on durability and elasticity. For the manufacturer it is important that the new production is much cheaper than the imported product, and that it did not require a rearrangement of the technological process.

15 tonnes of the new fibre have been already produced. It is used not only for the manufacture of fabric for firefighter's suits, but also as materials for filters working at high temperature.

Scientists plan to not limit themselves to just these fields of application. The work on the new polymer could be used for micro-reinforcement of automobile tyre casings, in particular for BelAZ, and it will help to remove the superficial cracking of rubber. The testing of the new material in asbestos free clutch plates and brake disks are currently in progress. They also aim to dilute the polymers in nonaggressive, organic solvents which would be suitable for creation of strong, heat-resistant coverings.