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**Special Report** 03

**Space** Russia lost ground in the space race during the turbulent 1990s, but the aerospace industry has learned to play by the new rules

# A Closed City Builds Satellites That Open Up the World

**In a setting out of a Cold War novel, engineers in the Siberian city of Zheleznogorsk create some of the world's most advanced aerospace systems.**

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SPECIAL TO RBTH

In the depths of the Siberian taiga, on the banks of the Yenisei River, lies the city of Zheleznogorsk. Founded in 1950 as a center for plutonium production, it isn't a place people move to. They can't. Even local residents have to have permission to leave and return.

Going through the fence that surrounds the city is like crossing a time warp into the 1950s Soviet Union. There are wide avenues flanked by five-story apartment blocks; in the center of town stands the Rodina [Motherland] movie theater and the main entrance to Information Satellite Systems (I.S.S.), the factory that, before the days of perestroika, built the world-famous Kosmos and Molniya satellites, the most powerful of their time. At the be-

About 40 satellites are in production at once, including secret military systems and global positioning satellites.

ginning of the 21st century, the city gained a new lease on life, thanks largely to the program to develop the Glonass navigation system, the Russian answer to G.P.S.

## Soviet-era status symbol

"In the 1960s, the whole Soviet Union dreamed of space! It was an honor and prestigious to work in the aerospace industry," said Vladimir Khalimanovich, now director of I.S.S. He moved to Zheleznogorsk 47 years ago from the central Russian city of Kazan. At that time, nearly every student dreamed of the opportunity to move to a place like Zheleznogorsk, because it was thought that only the very best were recruited to closed cities.

The prestige was one of the things that helped make the difficulties of living in a closed city worth the trouble. Living in a closed city meant that any friends or relatives interested in making a visit had to be vetted by the security services. "That procedure applies today, too," said Yelena Prosvirina, an I.S.S. engineer. "At first it's inconvenient to have to ask permission every time, but you soon get used to it."

During the Soviet era, there were other benefits, too. For example, certain types of food that were unavailable in ordinary Soviet cities could be bought in the



An I.S.S. employee tests a Telkom-3 satellite, built as part of a contract for an Indonesian telecom company.

## IN FIGURES

### \$50 million

is what it costs to build one satellite. An additional \$50 million is required to insure the object. Because the stakes are so high, satellites are tested at every stage of development.

### 8,500

people work at Information Satellite Systems, many of them recent graduates from top aviation universities. The high salaries make up for the challenges of living in a closed city.

closed ones. But unlike the residency restrictions, this changed with fall of the Soviet state. In the 1990s, the residents of Zheleznogorsk, like Russians anywhere else, were plunged literally overnight into the harsh conditions of capitalism. Like the majority of Russian enterprises, I.S.S. lost the lion's share of its state financing. The factory continued quietly building satellites for military purposes, but there were few new projects and the factory's workforce of more than 8,000 was cut almost in half.

In the 2000s, however, the government began to invest funds in the creation of the Glonass satellite navigation. Today, the state provides two-thirds of I.S.S.'s an-

nual operating budget of 20 billion rubles (\$625 million); the rest comes from commercial orders.

## The new capitalist reality

I.S.S. began winning international contracts in 2008. That year, Israeli satellite operator Space Communication, Ltd. ordered the AMOS-5 satellite; then, in 2009, Indonesia's PT Telekomunikasi bought the Telcom-3 telecommunications system. Later, contracts were signed with Ukraine and Kazakhstan.

"Every year we take part in four or five tenders, of which we win one. One international contract per year is enough for us. That's all we can handle at the moment," said Khalimanovich. Today, about



The I.S.S. complex in Zheleznogorsk shows off the company's logo.



I.S.S. director Vladimir Khalimanovich with engineer Yelena Prosvirina.

## Flying high on solar wings

It costs approximately \$50 million to build one satellite, plus about \$50 million (the launch cost plus 20 percent) for insurance. One small error results in a complete loss, so tests are done at each stage of construction. One of the most spectacular is the trial unfurling of the wings — the solar batteries of the finished satellite.

"The preparations can take several days. Operations begin only when the staff have checked everything multiple times and put loads of signatures on various documents and the client's representatives have switched on their video cameras for the minutes," said Sergei Apenko, chief designer for electrical testing and electrical design at I.S.S.

40 satellites are in production at the same time, including secret military systems, Glonass satellites, and telecommunications and geodesy satellites for Russian operators.

The increase in orders has allowed the factory to do some hiring. Today, 8,500 people work at I.S.S., and the majority of them are young. Newly minted engineers from the aviation universities in Kazan, Tomsk and Moscow are again drawn to Zheleznogorsk, but this time, the attraction is not prestige, but money. Salaries at I.S.S. are about twice the national average for new graduates. I.S.S. also has a co-op program that allows students in their final year of

study to get on-the-job training, with pay.

"I.S.S. is an excellent place for training staff. If we could, we would buy up the majority of its specialists," said the manager of a Moscow company involved in satellite construction who wished to remain anonymous.

The influx of new employees has benefited the town of Zheleznogorsk in other ways. New housing complexes are being constructed where young engineers can buy apartments under favorable terms. "The company covers half the interest," said I.S.S. employee Kristina Uspenskaya. But the services in the city are still not developed. The town has a population of almost 100,000 but there are only a few cafés, one restaurant, a single nightclub and one expensive movie theater. The lack of amenities is easy to explain. "It's difficult to start a business in a closed city. The process requires stacks of agreements. Therefore there's no competition," said Uspenskaya. Every week, she and her husband drive the 40 miles to Krasnoyarsk for a date — it's a lot cheaper there.

## QUESTIONS & ANSWERS

# Russia Ready to Compete in the Space Century

**Sergei Zhukov, head of the space technology cluster at the Skolkovo Innovation Center, discusses the role Russia can play as space exploration expands to include private companies.**

**Has the role of outer space in global politics increased in recent decades?**

The world economy is becoming more and more dependent on the intensity of space activities. The market for space technology production and services is variously estimated at between \$300 billion and \$400 billion a year. It has several segments, the biggest being satellite communications and telecommunications, navigation and distance Earth sensing. Russia's share in these segments is less than one percent. In the production of satellites, our share is 7-10 percent. Our share is traditionally high — 33 to 40 percent — in orbiting payloads, but that segment is small.



Sergei Zhukov heads the Space Technology Cluster at Skolkovo

**What prevents Russia from increasing its share of the world space market?**

On the one hand, state financing of space activities in Russia has more than tripled over the last five years and is still growing. The

new space strategy is widely discussed. On the other hand, there is virtually no private sector in the industry, whereas the world trend is toward ever more confident involvement of the private sector in space exploration. Besides, there is international division of labor in high-tech sectors, and Russia should not hesitate to form alliances with leading world producers.

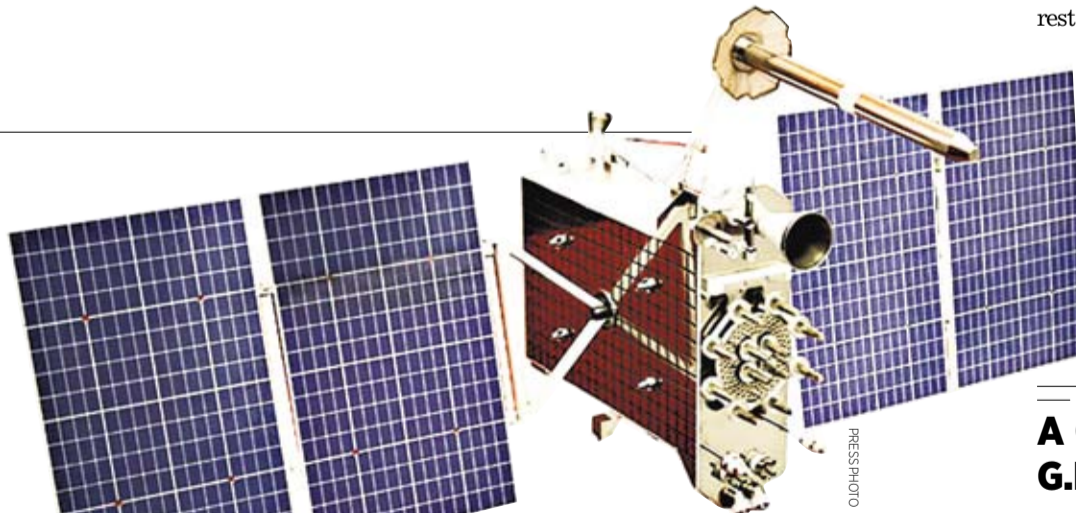
**Has the U.S. taken the lead in world space activities because of the development of the private sector?**

The United States today is the only country that pursues virtually all types of space activity. And no wonder: if one combines their civilian and military budgets, the sum is sure to exceed the total spending by the rest of the world on space activities. As for development of the private segment, the U.S. policy adheres to a strict

division of responsibility: study of the solar system, including planets and asteroids, is the business of the state, whereas developing near-Earth space is the domain of private companies. And you should remember that the giant contractors of the U.S. space agency today — be it Boeing, Lockheed Martin or Orbital — are all private enterprises. They ensure America's technological lead.

**Are any domestically made breakthrough products in the pipeline?**

That's a tough question. Russian energy and engine technologies have a good chance, by which I mean rocket engines and space nuclear plants. I do not rule out some less-spectacular but important technical solutions in the field of small space platforms and elements of on-board service systems. The Skolkovo project is working on such development.



**Are there others who are willing to support private initiatives in Russia apart from Skolkovo?**

We are not the only ones. Indeed, other development institutions began to support the commercial industry before we did. They include the Russian Venture Company and Rosnano. Vnesheconombank is actively investing in major projects.

**Are Russian businesspeople lukewarm about the space industry?**

Russia has virtually no legislation on commercial space activities. The federal law on space activities was passed in 1993 and remains basically a framework law. Private interests simply do not understand what rules to play by and businessmen are afraid to invest in the sector. And there are many restrictions, such as on high-resolution space photographs and on obtaining licenses for space activities.

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