

High-tech Siberian city has bounced back from the nightmare 90s; graduates from top aviation universities are trooping in large numbers

Glomass spurs rebirth of space hub

The Glomass has infused a new life and vitality into the Siberian city Zheleznogorsk, which is now attracting droves of young specialists.

ELENA SHILOVA
RIBR

In the depths of the Siberian taiga, on the bank of the river Yenisei stands the closed city of Zheleznogorsk, surrounded by a barbed wire fence. You can't just go and live there if you want to, and the local residents are only allowed to travel home if they have a pass, and even then they have to undergo a full check first. Once inside the city, it's like travelling back in time to the USSR of the 1950s and 1960s: there are wide avenues flanked by five-storey blocks of flats painted in different colours. In the centre stands the Rodina [Motherland] cinema, and the main entrance to the factory, which built the famous Kosmos and Molniya satellites, the most powerful of their time.



The Russian GLONASS satellite navigation systems are giving a tough competition to the American GPS systems.

Soviet romanticism
“In the 1960s, the whole USSR dreamed of space! It was an honour to work in the industry,” says Vladimir Khalimanovich, director of the Industry Centre of the M.F. Reshetnev Information Satellite Systems company (ISS). He came to Zheleznogorsk 47 years ago from Kazan when only the best and the brightest were recruited to closed cities, home to secret military establishments. Life in such a city meant living with a few restrictions: if you wanted to invite relatives or friends to visit, you had to get special permission from the security

service. But its attractions outweighed many irritations: Zheleznogorsk, for example, received centralised

The city only revived after the Russian government began investing in Glomass navigation system.

supplies of various goods, which it was impossible to obtain in ordinary cities in the USSR.

In the 1990s, the city fell on hard times. The centralised supplies of foodstuffs ceased, and people were

plunged literally overnight into brutal realities of capitalism. Like the majority of Russian enterprises, ISS, around which the city's life revolved, lost the lion's share of its financing. Subsequently, the factory's workforce of more than 8,000 people was almost halved, triggering an exodus to big cities. The engineers were only able to breathe easily at the start of the new century, when the government began to invest funds in the creation of the GLONASS satellite navigation system as a part of the space programme. A year ago, the system's 24 satellites became operational, giving a

tough competition to the American GPS. The state now provides two-thirds of 20 billion roubles that make up the ISS's annual turnover, with the rest coming from commercial orders.

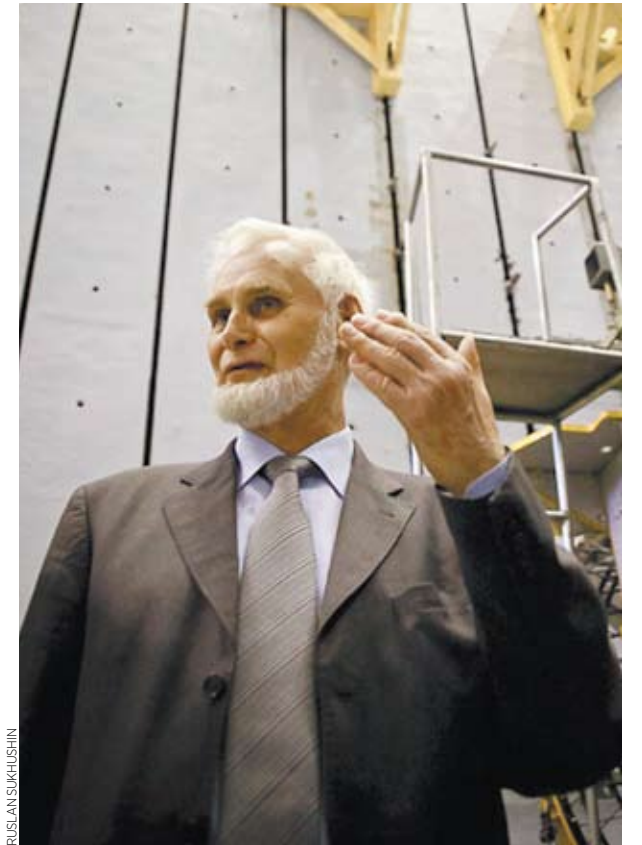
Realities of capitalism

Unfortunately, in those days, the ISS got so caught up with its internal issues that the Russians were almost 20 years behind, and the Americans took over the lead in building satellite systems, once considered the forte of the Soviet Union. It was only in 2008 that the ISS started getting international orders. First, the Israeli op-

erator Space-Communication Ltd ordered the AMOS-5 satellite, then in 2009, the Indonesian company PT Telekomunikasi Indonesia Tbk bought the Telkom-3 telecommunications system, and 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,” says Khalimanovich. Today, about 40 satellites are in production, including secret military systems, Glomass satellites, and telecommunications

A \$200 million gamble!

It costs approximately \$150 million to build one satellite, plus \$50 million – the launch cost plus 20% – for insurance. One small error means blowing up millions of dollars into space, literally. A huge number of tests are, therefore, done at each stage of construction. One of the most spectacular is the trial unfurling of the wings, i.e. the solar batteries of the finished satellite. “The preparations can take many days. Operations begin only when the staff has checked everything ten times and put signatures on various documents and the client's representatives have switched on their video cameras for the minutes,” says Sergei Apenko, chief designer for electrical testing and electrical design. And so the system is launched.



Vladimir Khalimanovich, ISS Industry Centre director.

starting out is \$1,000, while a graduate from a technical university can only hope to earn half that much. Inci-

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dentally, the ISS has retained the original Soviet training system for young specialists. After their fourth year in an institute, students come to the company and work for two years in various roles and gain experience, and

only after that do they defend their diploma. “ISS is an excellent place for training staff. If we could, we would buy up most of its specialists,” says the manager of a Moscow company.

The glory days of the past are still a long way, but the “new blood” has started to breathe new life into the city. A new housing estate has been built, where employees can buy a flat through a preferential mortgage system. “The company covers half the interest,” says ISS staff Kristina Uspenskaya. But people rue the dearth of cafes, cinemas and restaurants in this city of 100,000 people.

INTERVIEW

SERGEI ZHUKOV

Battle hots up for share of space pie

THE CHIEF OF THE SPACE TECHNOLOGY AT SKOLKOVO IS UPBEAT ABOUT RUSSIA'S PROSPECTS

ELENA SHILOVA
RIBR

Has the role of outer space in the global arena increased?

Indeed, the world economy is becoming more dependent on the intensity of space activities. The market for space technology production and services is around \$300 and 400 billion a year. It has several segments, the biggest being satellite communications and telecommunications (over \$100 billion), navigation and distance Earth sensing. Russia's share in these segments is less than one per cent. In the production of satellites, our share is 7–10%. Our share is traditionally high – 33–40% – in orbiting payloads, but that segment is small, about \$3 billion a year.

What prevents Russia from hiking its share of the world space markets?

The state financing of space activities in Russia has more than trebled over the last five years and is growing. However, there is virtually no private sector in the industry, whereas the global trend is an increasingly confident involvement of the private sector in space exploration. In this area, Russia should not hesitate to form alliances with leading world producers.

Does the private sector account for the US' dominance in world space activities?

If one combines the US' civilian and military budgets, the sum will exceed the total spending by the rest of the world on space activities. The US policy adheres to a strict “division of responsibility”: the 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. The giant contractors of the US space agency, be it Boeing, Lockheed Martin or Orbital, are all private enterprises. They ensure America's technological lead.

Do you think that people will prefer to holiday in orbit rather than on sandy beaches?

The case of Virgin Galactic, which has received payments from several hundred people for a future sub-orbital flight, shows that the space tourism market has a future. Many are prepared to pay hundreds of thousands of dollars to experience weightlessness and see the Earth from outside. When technologies become fairly safe and cheap, such travel could become fashionable. Russia is only planning to enter that market, but we have other promising projects. The Glomass system was

finally put together last year. This is the second navigation system in the world. The first (GPS) was made by the Americans. The Skolkovo Foundation today supports several navigation-related projects. This is the path towards the commercialisation of Glomass.

Any domestic “breakthrough products” on the way?

Russian energy and engine technologies like rocket engines and space nuclear plants have a good chance. I do not rule some less spectacular but important technical solutions in the field of small space platforms and elements of on-board service systems. The members of the Skolkovo project are working on such projects.

Who else is supporting private initiatives?

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 businesses lukewarm about space industry?

We have hardly any law on commercial space activities. Private interests simply do not understand what rules to play by and businessmen are



PROFILE
Who is Zhukov?

→ **AGE:** 55
→ **EDUCATION:** PHD IN ENGINEERING SCIENCES

Sergei Zhukov is Executive Director of the space technologies and telecommunications cluster at the Skolkovo Innovation Center. He was born on September 8, 1956 in the city of Zhezkazgan, Kazakhstan. In 1979, Zhukov graduated from the Bauman Moscow State Technical University with dis-

inction majoring in “nuclear power systems”. Zhukov has PhD in engineering sciences. Zhukov was in-charge of the astrophysics and radiobiology experiments on board the Mir orbital space station. He took part in foundation of the Federal State Unitary Enterprise “Russian technologies” in 1997 and “Vostochny” spaceport in 2007. Zhukov is test pilot, member of Russian Space Academy and President of the Moscow space club public association.

Is Skolkovo helping attract private capital into space exploration?

Our strategic goal is to attract scientists, engineers, industrialists and entrepreneurs from various countries.

Do you think that we can mine minerals on the Moon?

afraid to invest in the sector. There are many restrictions on obtaining licences for space activities.

So far, this is sci-fi stuff but I do not rule out that it might happen in a few decades. There is water, manganese and aluminium on the Moon and asteroids that are fit for making fuel and structural elements of space-ships and long-term stations. American business has plans to develop rare earth elements and deliver them to Earth. The world space business is developing rapidly and we shall just have to wait for the outcome.

Vision Russia, India team up in Chandrayaan 2 mission

Moon sparks a new power play

A new lunar race has emerged. Russia, India, US and other major space powers are eying the first manned flight to the moon.

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The race for lunar exploration has acquired a new momentum. Leading space powers, including Russia, the US, India, China and the European countries, are harnessing their best talents and technologies to score new milestones in this ongoing journey.

Russia has its Luna Glob (currently split into two separate orbital and landing missions) and Luna Resurs, which is being done in collaboration with India's Chandrayaan 2 mission. Currently, there are three NASA missions orbiting the Moon (GRAIL, ARTEMIS and LRO), with the next American lunar mission LADEE (Lunar Atmosphere and Dust Environment Explorer) scheduled for launch in May 2013. And then there is the Chinese Chang'e 3, which incorporates a lander and a rover. Europe is lagging behind the leaders, as there are no missions presently under development. The private sector may join the space sweepstakes as the Lunar Google X Prize is announced for the team to send a robotic rover to the Moon before the end of 2015.

The first stage of the Russian new lunar programme will begin in 2015, with the launch of the Luna-Resurs and Luna-Glob probes. Both are similar in design and will study south and north poles of the moon respectively.



The idea of going to the “seventh continent” is still alive.

After 2020, a new stage is scheduled with two bigger rovers planned for delivery. Their missions may last as long as five years, with rovers scouting the area as far as 30 km far from their landing spots. The data obtained will be used along with high-precision topographic maps of the Moon while the data on

The Moon is once again turning into an arena for political and possibly even cultural rivalry.

its composition will help understand the question of the Moon's creation, its inner structure, and its response to the gravitational pull of the Earth. Eventually, scientists hope to find the evidence on the size and composition of the Moon's core, and the history of its crust.

An accurate gravitational map would also help to study hidden mass concentrations

that distort gravitational fields. The data provides insight into the history of the Moon – apart from giving details on the Moon's surface, which are crucial for further exploration of the body. While actual activities on the lunar base building might seem dormant, the idea of going to the “seventh continent” is still alive.

The missions, set to materialise before the 2020s, are expected to contribute to the preparation for a manned Moon flight by 2025 or later. It may seem like a new Moon race, even though it is far less heated than its predecessor back in 1960s. The Moon once again is turning into an arena for political and possibly even cultural rivalry. While old space powers – namely the US, Europe, and Russia – talk of long-term goals for a lunar base and thorough preparation for a lunar human flight, new players on the field like China or Iran are going to struggle to find their way.