

Technology Renewed investment is attracting a new generation of aerospace experts to Soviet-era Zheleznogorsk

Closed Siberian city opens up the world of communications

In a setting straight out of a Cold War novel, designers and engineers are creating some of the world's most advanced satellite systems.

ELENA SHIPILOVA
SPECIAL TO RN

On the southern fringe of the Siberian taiga, on the banks of the Yenisei River, lies the city of Zheleznogorsk. Founded in 1950 as a centre for plutonium production, it isn't a place people move to. They can't: even locals need permission to leave and return to the city.

Going through the fence that surrounds the city is like crossing a time warp into the Fifties Soviet Union. There are wide avenues flanked by five-storey apartment blocks; in the centre of town stands the Rodina [Motherland] cinema and the main entrance to Information Satellite Systems – Reshetnev (ISS), the factory that, before the days

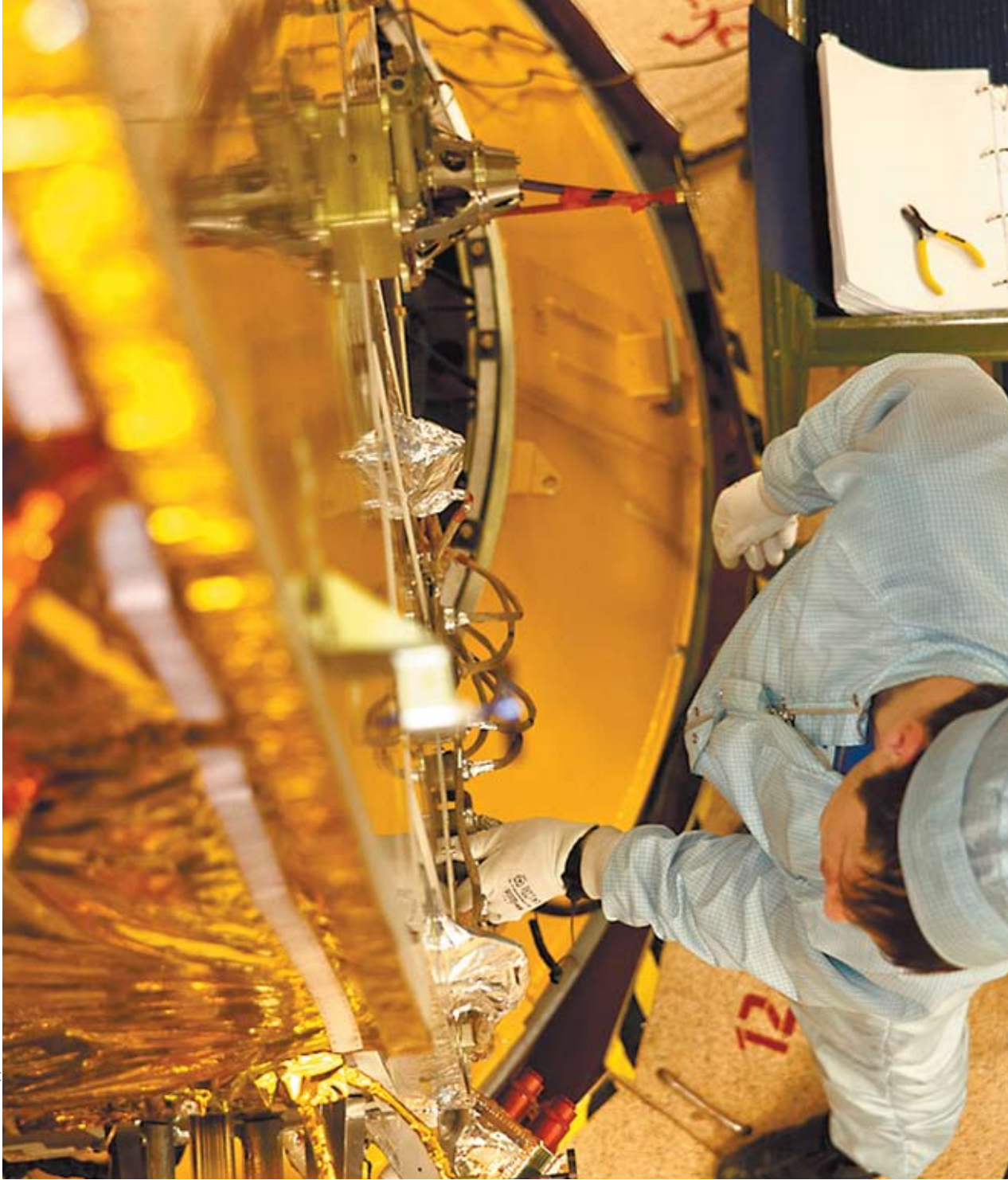
Friends and relatives of those living in the city have to be vetted by security before they can visit

of *perestroika*, developed the ground-breaking Kosmos and Molniya systems. At the beginning of the 21st century, the city gained a new lease of life, thanks largely to the programme to develop the Glonass satellite navigation system, the Russian answer to the American GPS (Global Positioning System).

Soviet-era status symbol

"In the 1960s, the whole Soviet Union dreamed of space. It was considered an honour to work in [the] industry and was very prestigious," says Vladimir Khalimanovich, now a director at ISS. 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 crème de la crème 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. For example, friends and relatives of those living in the city had to be vetted by the security services before being allowed to visit. "That procedure applies today, too," says ISS engineer Yelena Prosvirina. "At first it's inconvenient to have to ask per-



Testing, testing: an ISS employee checks a Telkom-3 satellite, built as part of a contract for Telkom Indonesia

THE NUMBERS

£400m

– the annual operating budget of International Satellite Systems. Two thirds is funded by the state and the rest comes from private contracts. Up to 40 satellites are in production at any one time.

8,500

people work at ISS, many of them recent graduates from well respected aviation universities. The high salaries make up for the challenges of living in a closed city.

mission every time, but you soon get used to it."

During the Soviet era, there were other benefits to living in a closed city. For example, certain types of food that were unavailable in ordinary Soviet cities could be bought in the closed ones.

But unlike the residency restrictions, this privilege changed with the fall of the Soviet system. In the Nineties, the residents of Zheleznogorsk, like Russians anywhere else, were plunged overnight into the harsh conditions of capitalism. Like the majority of Russian enterprises, ISS 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 in reviving and developing the Glonass satellite navigation system. Today, the state provides two-thirds of ISS's annual operating budget of 20 billion roubles (£400m); the rest comes from commercial orders.

A new capitalist reality

ISS began winning international contracts in 2008. That year, Israeli satellite operator Space-Communication Ltd ordered the AMOS-5 satellite. Then, in 2009, Telkom Indonesia signed up for the Telkom-3 telecommuni-

cations 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 a year is enough for us. That's all we can handle at the moment," says Mr Khalimanovich.

Today, about 40 satellites are in production at any one time, including secret military systems, Glonass satellites, and telecommunications and geodetic satellites for Russian operators.

The increase in orders has enabled the factory to increase its workforce again. Today, some 8,500 people work at ISS, of whom the majority are young. Newly minted engineers from the



On the face of it: the ISS complex in Zheleznogorsk



Two heads: Vladimir Khalimanovich and Yelena Prosvirina

Flying on solar-powered wings

It costs about \$50m (£32m) to build one satellite, and another \$50m (launch cost plus 20pc) for insurance. One small error can result in disaster, so a huge number of tests are done at each stage of construction. One of the most spectacular trials is the unfurling of the wings – the

solar batteries – of the satellite. "The preparations can take several days; operations begin only when staff have checked everything multiple times and the client's representatives have switched on their video cameras," says Sergei Apenko, chief designer for electrical design and testing at ISS.

aviation universities in Kazan, Tomsk and Moscow are again drawn to Zheleznogorsk, but this time the attraction is not prestige, but money. Salaries at ISS are about twice the national average for new graduates. ISS also has a programme that allows students in their final year of study to get on-the-job training with pay.

"ISS is an excellent place for training staff. If we could, we would buy up the majority of its specialists," says 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 complex-

es are being constructed where young engineers can buy apartments under favourable terms. "The company covers half the interest," says ISS employee Kristina Uspenskaya.

However, the facilities in the city are still inadequate: the town has a population of almost 100,000, yet there are only a few cafés, one restaurant, one nightclub and one expensive cinema. This lack of amenities is easy to explain. "It's difficult to start a business in a closed city," says Mrs Uspenskaya. "The process requires many agreements, so there's no competition." For a night out, she and her husband drive the 40 miles to Krasnoyarsk, as it's a lot cheaper there.

QUESTIONS & ANSWERS

Plenty of space for private sector involvement

Skolkovo's Sergei Zhukov discusses Russia's expanding space industry as it receives more funding and develops new technologies.

ELENA SHIPILOVA
SPECIAL TO RN

Why 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 \$300bn (£190bn) and \$400bn (£255bn) 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 1pc. In the production of satellites, our share is 7-10pc. Our share in orbiting payloads is traditionally high – 33 to 40pc – but that segment is still very small.



Urban spaceman: Mr 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 in the past five years and is still growing. The new space strategy is widely discussed. On the other hand, there is

virtually no private sector in our space industry, whereas the world trend is toward ever more confident involvement of the private sector. Besides, there is an international division of labour in hi-tech sectors. Russia should form alliances with world-leading producers.

Has the United States taken the lead in world space activities because of the development of its private sector?

The US 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 US 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 US space agency today, be it Boeing, Lockheed Martin or Orbital, are all private enterprises. They ensure America's technological lead.

Are there 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 these developments.

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



Are Russian businessmen lukewarm about investing in the space industry?

Russia has virtually no legislation governing commercial activities in space. 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 in this area, and businessmen are afraid to invest in the sector as a result of this lack of understanding. And there are many restrictions in this highly specialised field, such as on the use of high-resolution space photographs and on obtaining licences for space activities.

Glonass: a business heading in the right direction

Glonass – an acronym for Globalnaya Navigatsionnaya Sputnikovaya Sistema, or global navigation satellite system – was developed in the Seventies and Eighties. It was designed as a replacement for an earlier navigational system that required hours of observation to fix a position, making it completely unsuitable for naviga-

tional purposes. After the fall of the Soviet Union, the Glonass system went into a state of decline because of budgetary constraints until Vladimir Putin made its restoration a top government priority early in his first presidency. By 2012, Glonass had achieved full coverage of the planet's surface via 24 functioning satellites.

More than \$4.7bn (£3bn) has been spent on the project over the past decade – one third of the total budget of the Russian space agency, Roscosmos. According to online publication thenextweb.com, Glonass now provides better accuracy than GPS in some parts of the northern hemisphere due to the positioning of its satellites.

OPINION

We need hi-tech demand at home

Andrei Bunich
SPECIAL TO RN

Recently, Russia's efforts in developing a hi-tech production industry have focused on two different strategies: cultivating scientists and businesspeople willing to develop innovative products; and on providing sources of credit (through investment banks, business angels and venture capital) for those individuals and companies. Unfortunately these efforts ignore the most critical element needed for success: the end users who benefit from hi-tech production.

At the Skolkovo Innovation Summit, I heard the same question again and again from managers: what specific market are these products being developed for? Is there already a strong demand from Russian industry to use innovative products in modernising production and improving efficiency?

Of course, success stories already exist in cases where there is definitely a demand, and a robust market. For example, Yandex, Russia's largest search engine, has done remarkably well honing its unique technology to the needs of the Cyrillic alphabet and Russia's exploding base of internet users (which became the largest in Europe this year). The company has also successfully addressed problems of everyday Russian city dwellers via its Yandex maps and traffic services (www.yandex.ru/maps) which it claims are superior to those offered by Google for the Russian market. These factors have not only helped Yandex maintain its leading posi-

Existing state policies are directed at creating products for western markets... a long-term strategy is needed to generate domestic demand for innovation

tion in Russia but also prompted a record-breaking IPO last year on New York's Nasdaq exchange.

To cultivate more success stories like this, the Russian state needs to send out a strong signal that it is willing to implement a long-term restructuring of the economy, via tax breaks, fighting inflation and other business-friendly policies, within a 10- to 15-year time frame that would encourage value-added production. Additional funding for universities, business incubators and venture funds would then bolster those policies.

One of the greatest faults of existing state policies is that they are directed at creating products for western markets. While some successes have been achieved by Russian innovators (notably, Kaspersky Anti-Virus software, which exports around 80pc of its production), I'm convinced that a long-term strategy is needed for weaning Russia's economy off raw materials and also to generate domestic demand for innovation.

Skolkovo's Technopark may be an efficient vehicle for generating demand by providing both favourable business conditions for innovators and linking them with both domestic and international companies interested in modernising production. I hope more broad, nationally significant efforts at stimulating this demand will follow suit.

Andrei Bunich is a prominent Russian economist and regular commentator for Kommersant FM and other Russian media outlets.