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'Russia Is No Place for Dreamers:' Meet the Rocket Entrepreneurs Battling Bureaucracy to Conquer Space

Rocket science is hard. But bureaucratic red-tape and a conservative investment climate make the almost impossible even harder.

By Matthew Bodner

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Alexander Kaltushkin (C) and Alexander Ilin (L) both dreamt of flying to space as children. Now, as co-founders of stLin Industrial, they might have a chance. **Independent Media**

Alexander Kaltushkin was taking cover behind a flimsy shed in an abandoned industrial park near Moscow when his team pressed the launch button.

An instant later, the empty lot shook. A piece of shrapnel flew past Kaltushkin, penetrated a

fence encircling the lot and embedded itself in the wrist of a bystander. Then, peaking from the shed, Kaltushkin could see the smouldering remains of a small trailer.

Anyone watching could be forgiven for thinking Kaltushkin and his motley crew of wannabe rocket scientists had set off a bomb. Instead, mounted to a stand inside the trailer was a small rocket engine that Kaltushkin and his cohort had spent three years and over $90,000 designing.

There are a few ways to describe what happened — "just don't call it an explosion," Kaltushkin says with a grin. "I like to call it 'rapid, unplanned disassembly.'"

This junkyard testing may give the impression that Kaltushkin's startup, Lin Industrial, are just amateurs tinkering with dangerous toys. But they are actually young entrepreneurs — with rocket science backgrounds — looking to solve one of the space industry's biggest problems.

Small Solutions to Big Problems

The global space industry can generally be divided into two groups. The first consists of companies that build the satellites, like the ones that beam television signals and GPS data. The second group are the rocket providers — a sort of cosmic delivery service for those satellites.

The global space industry — valued at $323 billion in 2015 — is booming. But the growth between these two groups is not equal: While private enterprise has driven growth in the satellite market, rocket production and launching is still dominated by government-owned or state-backed firms. Russia is the textbook example.

Lin Industrial wants to be the first company to challenge that monopoly in Russia. But they are not taking the government head on. Instead, they are targeting a specific portion of the growing satellite launch market: universities, startups, and research teams who want their small satellites (weighing under 180 kilograms) to reach space.

According to Euroconsult, a Paris-based consulting firm, over 3,500 small satellites are expected to be launched over the next decade — a 76 percent increase over the previous decade. This doesn't even account for the 4,000 small satellites that entrepreneur Elon Musk and his SpaceX company plan to launch.

This class of satellites is democratizing space because they are cheap and customizable. Anyone can conceivably buy one. The problem is launching it. There are not enough rockets to go around, leading to delays and launch bottlenecks. And the situation is worsening. The rocket launch market has yet to tailor its services to small companies.

Existing rockets are generally old designs intended to launch massive communications satellites. Today, the only way to launch a small satellite is by hitching a ride with a large satellite, the main customers for the rocket launches. This limits where and when small satellites can be launched. But startups like Lin Industrial are racing to build small rockets for small satellites.

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Childhood Dreams

For Kaltushkin and Alexander Ilin, Lin Industrial's co-founder, this market opportunity opened a door to realizing childhood dreams of exploring the cosmos.

At the end of the 1980s, the Soviet Union was on the verge of launching into another golden age of space exploration — building a space shuttle, a new space station, and a large rocket to fly to Mars. Growing up in a rural town outside Russia's southern city Rostov-on-Don, Kaltushkin wanted to be a part of this high-tech world. "At night I looked up and dreamt of flying to space," he says.

But this vision of space exploration died alongside the Soviet Union. The new space shuttle flew just once, and was destroyed when a hangar collapsed. The USSR's ambitious plans to explore the Solar System were archived, then forgotten.

A career in Russia's space industry — once illustrious — now invited poverty. And so, in 1998, Kaltushkin went off to university to study information technology. "I realized that I couldn't survive if all I knew how to do was land a space shuttle."

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Coming Together

Ilin's path to space was more direct. He attended a special high-school focusing on math and physics education, and eventually studied rocket engineering at Moscow's Bauman Technical University — a traditional clearinghouse for Russian space scientists.

After graduation, he worked in the space industry for seven years until he was laid off amid Russia's economic crisis. There was no money to pay engineers, and more importantly, no money to finance new space projects.

By 2013, entrepreneurs in the West with deep pockets were starting to compete with government agencies and aerospace monopolies. Kaltushkin and Ilin, still enamoured with the promise of space, saw the emergence of private space enterprises and thought: "Why not try it here?"

"We first met each other online and began to talk a lot about what humanity's future in space should look like, what rockets should do, and where interplanetary probes should fly to," Kaltushkin says. All they needed for Lin Industrial to become a reality was $7 million. But where would they get it?

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Better than Nothing

The Skolkovo project, spearheaded by Prime Minister Dmitry Medvedev, was founded in 2010 to jump-start Russian tech. It's received mixed reviews. "All current Russian space startups began there," says space industry expert Pavel Luzin. "But where are the results?"

The problem lies in how Skolkovo, whose investment packages can reach up to 150 million rubles ($2.7 million), works as a startup accelerator.

"Skolkovo's framework is good for supporting startups, but it needs to be scaled up significantly to support rocket startups," says Ivan Kosenkov, an analyst at the Skolkovo Space Cluster incubator. "150 million rubles will maybe cover the initial design studies."

Skolkovo also requires startups to find a co-investor to match their investment, ruble-for-ruble. When Lin Industrial first approached Skolkovo in 2014, they were told they needed to find such an investor and reapply for a grant.

Kaltushkin and Ilin found that investor in an unlikely place: Minsk, the capital of neighboring Belarus. His name is Sergei Burkatovsky, head of Wargaming, the studio behind the online gaming phenomenon World of Tanks. Burkatovsky, trained as a nuclear engineer, has always been fascinated by space.

Burkatovsky did not reply to a request to comment on his support for Lin Industrial.

Burkatovsky was committed, but would only contribute 5 million rubles ($90,000). With the sum matched by Skolkovo, the ambitious startup set off with just 10 million rubles. It was better than nothing.

Skolkovo has given more to other space startups in the past. Dauria Aerospace, a startup working on small-satellites, received a full 150 million ruble grant because they had the investors to match it. "I don't think we would have any problems in granting more funding to Lin Industrial if they attract more private funding," Kosenkov says.

10 million rubles ($180,000) was enough to begin work on developing and testing key components of their Taimyr rocket. But Kaltushkin and his team knew they would need more money. The only other obvious place to look was Roscosmos, the Russian space agency.

Cosmic Catch-22

Approaching Roscosmos might have seemed the obvious next step: America's recent space industry triumphs were made possible by sustained and targeted investments from its government space agency, NASA. (Musk's latest rockets would have never made it off the drafting board without NASA).

But unlike their U.S. counterparts, Roscosmos has no funding or obligation to support startups. Its sole mandate is to consolidate and save Russia's state-owned rocket monopoly from sliding into oblivion. Startups like Lin Industrial are just not part of the picture.

Even if Roscosmos weren't bloated by inefficient spending and endless bureaucratic

reshuffling, says Kosenkov, "Roscosmos doesn't really understand the benefit of supporting startups."

To complicate matters, Roscosmos has a monopoly on space hardware manufacturing in Russia. This means Lin Industrial will eventually need their help — and official approval — to build its first rocket.

When Kaltushkin and Ilin approached Roscosmos in 2014, they were told there was no money to support them. Although the agency was happy to offer conversational support, "they said we needed to have a complete working product before they would offer any additional help."

For a rocket startup, this was the ultimate Catch-22. Lin Industrial can't build its rocket without additional investment. But it can't get additional investment without a rocket.

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Uncertain Future

In the United States, it was NASA's efforts to fund private efforts and guide them to the market that turned the tide. Without Roscosmos stepping up to foster development, Russia is losing the private space race.

But even if Lin Industria finds an investor willing to drop millions on the project, success in not guaranteed. In the West's successful private industry, similar projects have failed and declared bankruptcy.

"It takes more than rocket science to bring a new small rocket to market," says Euroconsult's Maxime Puteaux. "Many current projects are at risk — even the most advanced launchers under development can fail."

Undeterred, Lin Industrial has made decent progress with their initial seed money from Skolkovo and Burkatovsky. Although the engine test didn't go well, they've learned a lot, Kaltushkin says. They've even done small-scale flight testing.

While their primary focus is eventually making money off their Taimyr rocket by launching small satellites, Lin Industrial aspires to greater things: moon probes, a moon base, and eventually colonizing the Solar System. For Kaltushkin, it's about more than money. It's about a vision of a shared cosmic future — the one they were promised as children.

Asked if Lin Industrial would join Musk in colonizing Mars, Kaltushkin points to a topographical map of Venus on his office wall: "We are going there," he says, "not Mars, where it is cold. Russians understand cold, but Musk does not."

Skolkovo's Kosenkov says Lin Industrial is well on its way to begin seizing this vision of the future. "They've made significant progress in my opinion. The delays they are experiencing are normal for a rocket startup."

Luzin, a space policy researcher at Perm State University, is less optimistic: "These guys are

clearly smart and they believe in space," he says.

"But Russia is no place for dreamers. The U.S. needed two decades to create a working institutional environment for space startups. Russia has not even seriously begun the process."

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