These Boots Were Made for 22 M.P.H.

Joseph Sywenkyj for The New York Times

Marat D. Garipov's boots have tanks that hold a third of a cup of gasoline each, meaning the boots get about 70 miles per gallon. More Photos >

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Published: March 17, 2007

UFA, Russia — Being a star engineering student at the top-notch science university here wasn't enough to exempt Viktor K. Gordeyev from his physical education class.

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Boots Powered by Gasoline

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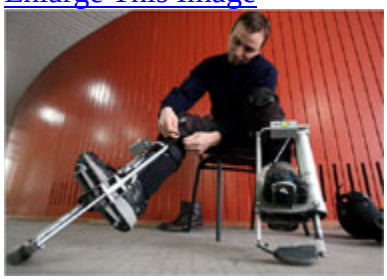

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Mr. Gordeyev, a specialist in airplane piston engines, sweated it out with everyone else, running laps in lumbering heavy boots in this town in the foothills of the Ural Mountains.

He vowed to find an easier way. Eventually, he found one — or at least came close. Mr. Gordeyev invented a gasoline-powered boot that looks like pogo sticks that strap to your shins, and they work on the same principle as the air-cushioned basketball shoe.

But rather than being dismissed as a crackpot invention, his boots — which use tiny pistons — became classified as a Russian military secret until 1994.

Now, they have been held up as a symbol of both Russia's deep and rich scientific traditions and the country's inability to convert that talent into useful — and commercial — merchandise outside of the weapons business.

Many government officials, Russian scientists and economists are focusing these days on the need to generate new sources of growth to diversify the country's economy away from oil — the unsteady source of Russia's recent prosperity.

And there is a growing consensus that entrepreneurialism has promise but faces serious obstacles, including no vibrant mechanism to bring together venture capitalists, inventors and entrepreneurs to develop viable commercial products.

In February, President Vladimir V. Putin implored the country's most prominent businesses to branch out and invest in innovation and science. German O. Gref, the minister of economic development, often says Russia's scientific base distinguishes it from other emerging market economies in India, China and Brazil, even though Russia is often compared to them.

But as part of a series of pointed articles, the Russian edition of Popular Mechanics magazine argued that Mr. Gordeyev's thwarted attempt to commercialize the shoes is a symbol of the country's failure to tap its considerable scientific talent for profitable business ideas.

The dream Mr. Gordeyev conceived in 1974 to run faster and jump higher without getting tired might never have become a popular option for commuters or even caught on as a sport. But unlike the Segway, the American-invented self-balancing scooter, it never had a chance.

Instead, the boots became a military secret, as generals envisioned soldiers running swiftly and effortlessly alongside armored vehicles.

The boots were declassified in 1994, and Mr. Gordeyev and his partners imagined growing rich by selling their invention to a lazy public. Instead, the company went out of business in 2006.

Like the boots, Russian scientists are still trying to gain traction in the capitalist world. A company in Saratov making a novel transport airplane with no tail, called the "flying saucer," never got off the ground.

Russia also has other examples of good ideas later bungled in the process of commercialization. The Russian inventor of the Tetris video game was unable to patent his invention, and thus lost out on huge amounts of money. Russian engineers invented submersible pumps for oil wells, but failed to invest in their development; now Russian companies buy Western models from Halliburton.

And, in contrast to the United States, venture capital firms and start-up companies in Russia have not congregated near technology universities. Russian computer programmers, successful in Silicon Valley, are best known at home for hacking.

"Venture capital firms are starting to work here, but as a rule, if something comes to their attention it is an exception," said Igor R. Belousov, a Hewlett-Packard executive who coordinates the company's research at Russian universities.

Meanwhile, natural resources account for 80 percent of Russia's export revenue; crude oil and natural gas alone account for 65 percent.

To encourage foreign companies to invest in cities rich in scientific talent, Mr. Gref's ministry is setting up technology parks with tax breaks in St. Petersburg, Moscow, Nizhny Novgorod and Novosibirsk.

In another example, Boris V. Gryzlov, the speaker of Parliament, said in February that his political party, United Russia, should help Russian inventors find markets for their ideas. The program is called the Idea Factory.

Like so much else in Russia these days, it envisions a big role for the Kremlin in venture capital; some 30 committees would recommend scientists for state grants. That approach is not surprising, given the country's history of channeling industrial innovation into its military — the first home of Mr. Gordeyev's shoes.

For now, though, the boots remain a curiosity, without the wider distribution their owners hoped for.

“Everything that would happen in an engine happens when you step down” in the boots, said Rustam D. Enikeev, the dean of the faculty of internal combustion at the Ufa State Aviation Technical University.

A step down compresses air in the shoe as in a typical sneaker, said Mr. Enikeev, who was a designer on the project. But then, a tiny carburetor injects gasoline into the compressed air and a spark plug fires it off. Instead of fastening a seat belt, the institute’s test runner, Marat D. Garipov, an assistant professor of engineering, strapped on shin belts at a recent demonstration. Then he flicked an ignition switch.

Before running down a university corridor, he jumped in place a few times to warm up the engine. Mr. Garipov then ran laps for about 10 minutes, going about 12 miles per hour, with the two-stroke boots emitting small puffs of exhaust.

A test runner once topped out at 21.7 miles per hour, despite the risk of being sent off-balance.

The tanks in the shoes hold a third of a cup of gasoline each and will take the runner three miles; that means the boots get about 70 miles per gallon.

But even after years of research, gasoline-assisted running remains dangerous.

“The worst situation is when the spark fires as the runner just lands, and the force of the blast is absorbed by his body,” Mr. Garipov explains flatly.

The two powerful engines tend to throw a wearer off balance or cause knees to buckle.

Mr. Gordeyev, the inventor, now 61 and retired, disagrees that the boots are dangerous and still has visions of their mass adoption. “We’ve been running in them for years and we haven’t had one trauma,” he said in a telephone interview. “The latest version operates smoothly. It will become a device for moving humanity. It’s a means of personal transportation.”

First, the institute tried to interest the Soviet Army.

“We ran in the corridor of the general staff building, in front of the generals” and the minister of defense, Mr. Enikeev said. “They liked it, and were even a little frightened.”

An order came down for the paratroop command to test the boots, and the design became classified. This gave the university access to government laboratories in Moscow, including those of the space agency.

One result of the Russian space agency testing was a calculation that the energy in calories used to move the two-pound boot at a run would exceed the energy input from the gasoline engine. That meant, it was more tiring to run with the motorized footwear than without it, undermining the original rationale.

Only if the weight could be reduced to below 2 pounds per boot would the wearer have a net energy gain. So far they have failed at this.

After the shoes were declassified in 1994, when capitalism was beginning to sweep across Russia, the inventors decided to market the boot.

A former student, Anfis G. Saibakov, formed a company called Ekomotor to design a user-friendly version. He imagined people might want to commute in the boots, as they do on bicycles or rollerblades. None of this happened.

When Mr. Saibakov demonstrated the boots at Disney World in Florida in 1998, safety came up as a concern, he said, and the company lacked money to fine-tune the product.

“They don’t have characteristics that would allow an ordinary person to use them,” Mr. Saibakov said glumly, admitting that running in the shoes would always mean “taking certain risks.”

“They should work like a Kalashnikov,” he said. “Reliable in anybody’s hands.”

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