



Russian Exoskeleton Development

OE Watch Commentary: The following *Novosti* interview with Maksim Skokov, a deputy in the development of Russian exoskeleton systems, lays out a brief history of Russian work in this field. According to the article, the Russians tested an exoskeleton in Syria in 2017. Russian engineers testing the Uran-6 mine clearing, unmanned ground vehicle had to carry a heavy command-and-control system strapped to their chest. However, the EO-1 Ratnik exoskeleton enabled these engineers to keep up with ease. According to the interview, Skokov discusses Sotnik, which is a third generation exoskeleton that is supposed to debut in 2025. His firm is developing exoskeletons and robots for Russian Armed Forces, the National Guard, the Federal Security Service, and others in industry. **End OE Watch Commentary (Grau)**

“Several variations of exoskeletons have been developed for different tasks. There are three main types of tasks. The first is march-related, when a soldier needs to move quickly and effectively and efficiently perform dynamic combat tasks. The second is a low-movement task. For example, sappers, miners who do not need to run anywhere but who work with heavy equipment and equipment. The third group is rigging and various loading operations.”

Source: “Максим Скоков: для российской армии создается несколько экзоскелетов (Maxim Skokov: several exoskeletons are being created for the Russian army),” *RIA Novosti*, 28 September 2020. <https://ria.ru/20200928/ekzoskelety-1577781686.html>

Exoskeletons that multiply a person’s physical abilities are no longer a fantasy – such developments are currently implemented not only in the world’s advanced armies, but also in industrial enterprises, helping to boost workers’ endurance and productivity. Maksim Skokov, deputy director general for special projects of the enterprise Rostekh-Trusted Platforms – Robotic Systems [Rostekh-Doverenniyye platformy – Robototekhnicheskiye komplekсы] (RT-DP RK) was interviewed by... Ivan Surayev about the creation of an exoskeleton for the new generation of Sotnik combat equipment, advanced projects for the Russian special services, and also the company’s developments in the field of unmanned aircraft and robotics.

[Surayev] How did your company come into being, and what main results have you managed to achieve so far?

[Maksim Skokov] RT-DP RK was founded in 2016 by decision of the Rostekh state corporation. The company was created to attract private investment in projects of national importance, mainly orders from the Russian Federation Ministry of Defense. Today, we are a design bureau specializing in the development of robotic systems and complexes, including unmanned ground-based vehicles and unmanned aerial vehicles and exoskeletons for civilian, special, and military purposes. The production facilities and testing site are located in Vladimirskaya Oblast.

We have the necessary licenses, including those issued by the FSB [Federal Security Service] of Russia to work with state secrets and the Russian Federation Ministry of Industry and Trade to develop military products classed as “Unmanned Systems and Aircraft.”

Our first projects were related to the development of unmanned aerial vehicles. We worked on the possibility of specific use of drones in the interests of the Armed Forces, including for delivering goods to hard-to-reach places. In addition, our company carried out work for radiation, chemical, and biological defense troops; we demonstrated the possibility of using standard flamethrowers from drones. Development work was opened based on the results of the tests.

[Surayev] What is the point in putting a flamethrower on a drone? It’s easy enough to shoot it down...

[Skokov] You are wrong there. When testing the technology with spetsnaz, they found that it is very difficult to shoot down a UAV without proper training. Countering small unmanned aerial vehicles is a serious problem for all the armies of the world today.

I would like to note that our main focus today is still on another topic – the development of exoskeletons, wearable devices that can increase a person’s physical capabilities when performing heavy work and reduce the risk of industrial injuries under harmful or dangerous working conditions.

[Surayev] Are you involved in the development of exoskeletons for the Russian equipment of the soldier of the future, the new-generation Sotnik?

[Skokov] Yes, we have been participating in this project since 2018 and interact with the main developer of the combat equipment set – the Central Research Institute of Precision Engineering (TSNIITOChMASH). Right now we already have prototype exoskeletons. We demonstrated them during “Government Week” at the ERA Technopolis and at the Army-2020 international forum.

In addition, we participated in cooperation on the development of an active exoskeleton for the needs of the Ministry of Defense and, in 2019, we successfully defended our part of the work. The work was mainly performed by the Central Research Institute of Robotics and Technical Cybernetics (TSNII RTK). Apart from us, Android Technology [Androidnaya tekhnika], the Southwestern State University, and the Rokad Scientific and Technical Center participated in this project. Several variations of exoskeletons have been developed for different tasks.



Continued: Russian Exoskeleton Development

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[Continued]

There are three main types of tasks. The first is march-related, when a soldier needs to move quickly and effectively and efficiently perform dynamic combat tasks. The second is a low-movement task. For example, sappers, miners who do not need to run anywhere but who work with heavy equipment and equipment. The third group is rigging and various loading operations.

A distinctive feature of our exoskeleton is that it does not restrict the soldier's movement. We showed a demonstration sample of it at Army 2020. The introduction of our development into the new equipment model will help to take the strain off the soldier's musculoskeletal system, provide increased endurance by relieving muscle groups, and boost his combat capabilities.

We place a serious emphasis on ergonomics – the exoskeleton should not restrict the soldier's movement, and there are some successes in this area. A soldier equipped with our skeleton can sit down, run, lay down, rollover into cover, and so on without additional effort.

This summer, an important event occurred for us – the Ministry of Defense decided to categorize the topic of exoskeletons and robotics into a separate system. It should be understood that the work on combat equipment for the military is divided into separate systems: life support, protection, power supply, and so on.

Until this summer, the exoskeleton was part of the life support system, but now, having allocated this part of the equipment in a separate area, which will have its own chief designer, the Ministry of Defense will more closely monitor the work and formulate clearer technical requirements for them.

We are also working with other security agencies – Rosgvardiya [Federal Service of National Guard Troops], the FSO [Federal Protection Service], the FSB. They were interested in our development, called “Shchitovik” [Shield]. During an assault with the spetsnaz, there was an operative carrying a large armored shield in front of him, covering himself and his comrades walking behind him. His task is to move slowly, call fire on himself, and protect other spetsnaz. The weight of such a shield can reach up to 45 kilograms, the Shchitovik exoskeleton makes it possible to reduce this load.

[Surayev] *At what stage is this work?*

[Skokov] *For now it is a matter of prototypes.*

[Surayev] *Recently, there have been press reports about the ProEXO exoskeleton for industrial work; what are the prospects for this project?*

[Skokov] *Implementation of this development should increase labor productivity and reduce worker fatigue. The project won the Rostekh innovation competition “Vector” – we expect to receive a grant and start serial production of the ProEXO. At the beginning of next year, we plan to release the first samples of this exoskeleton for sale. Potential consumers are large companies such as Rostekh, Gazpromneft, Rusal, Rosatom, and SUEK. Companies that are engaged in mining, manufacturing, logistics, and freight transportation.*

One of the elements of an industrial exoskeleton that we have created for workers is the so-called exochair [ekzostul]. This is a technology that allows a person to sit while standing. The exochair fixes the position of the knee joint, and the person feels as if he is sitting on a real chair. The device will help those workers who stand behind a conveyor belt for an entire shift. There have been many studies showing how the productivity of such monotonous work falls during the day.

[Surayev] *Have you already tested this technology on real workers?*

[Skokov] *The testing of civilian exoskeletons is complex, and their precise methods have not yet been developed, either in Russia or abroad. Our country has an Institute of Occupational Medicine which claims to be a leader in this field. By 2021, the Institute should develop two state standards certifying exoskeletons as personal protective equipment.*

[Surayev] *Could you tell us about your projects in the field of robotics – what was the Uspekh [success] system developed for, and at what stage is this work now?*

[Skokov] *The initial goal of the project is to develop an onboard control system or, more simply, “brains” for a robotic platform that works not only on radio control, but also has artificial intelligence. A platform equipped with Uspekh must itself identify the terrain, make decisions on how to avoid obstacles, and so on.*

For the experimental model, we used a civilian all-terrain vehicle. Later, these “brains” can be installed on any military equipment – a tank, armored personnel carrier, armored car, and so on, to make a full-fledged robot out of a combat vehicle. The tests were successful, and three research and development projects were opened to develop these ideas.