

The Shahed Playbook

How Iranian and Russian Drone Production Will Disrupt Modern Warfare

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No weapon is more emblematic of the new chapter of drone warfare than the Shahed, an Iran-designed one-way attack (OWA) drone that functions as a cheap, easy-to-assemble cruise missile. The proliferation of Shahed-131 and -136 UAVs—known as Geran-1 and -2 in Russia—since their first confirmed use in 2019 has reshaped the battlefield in Ukraine and the Middle East.^{[1][2]} Russia has launched near-daily swarms of drones to overwhelm Ukrainian air defense, with a record 4,335 Shahed-type UAVs launched in April 2026.^[3] Iran has similarly relied on these drone systems to strike targets in the Middle East during the 2026 US-Iran conflict.^[4]

The Shahed-131 and slightly larger Shahed-136 platforms are inexpensive and easy to operate yet costly to intercept. An amateur can easily assemble them from commercially available components and launch them from the bed of a pickup truck for a fraction of the cost of traditional interceptor missiles.^[5]

The Shahed system is at the nexus of the China-Russia-Iran partnership.^{[6][7]} China has been especially active in helping Iran acquire critical components via sanctions evasions and technology transfers.^{[8][9]}

Beyond battlespace deployments, the Shahed supply chain and production models have significant implications for the future of conflicts. “Cheap, long-range precision saturation strikes are one of the greatest threats to international security,” says drone expert James Patton Rogers of the Brooks Tech Policy Institute.^[10]

Cost	\$20,000–\$50,000
Range	Shahed-131: 700–900 km Shahed-136: 2,000+ km
Warhead	Shahed-131: 10–20 kg Shahed-136: 50–90 kg
Output	444/month (2024 average at Alabuga)

Shahed-131 and -136 technical details^{[11][12]}



Workers transport a completed Geran-2 UAV at the Alabuga factory in Tatarstan, Russia (2025)^[13]

Medium-range, difficult-to-defend direct-attack missile systems were once the purview of states willing to invest millions. The Shahed’s affordability, ease of replication, and efficiency against traditional countermeasures make it attractive to a wider array of actors interested in OWA drones, which could give rise to a new type of global arms race. By granting attainable aerial strike capability to small- and medium-sized states as well as non-state actors, Shahed UAVs have the potential to intensify regional conflicts beyond previous limits imposed by military capacity.

Production Models

Iran

Iran has a long history of UAV development, with its Shahed system going from concept to launch in less than 20 years.^{[14][15][16]} Over time, Iran has devised a simple, reproducible platform with a dispersed, difficult-to-disrupt production chain spread across several key nodes:^{[17][18]}

- Shahin Shahr manufacturing facility near Isfahan, run by Iran Aircraft Manufacturing Industrial Company (HESA)
- Shahid Karimi UAV Base training base in Kashan
- Deployment facilities in Chabahar and Konarak
- Sea-based launch platform aboard the *IRIS Shahid Bagheri* (destroyed on 2 March 2026 during Operation Epic Fury)

Some components, such as the MD-550 motor, are produced domestically. Others, such as guidance, navigation, and airframe parts, are sourced from foreign entities—often in China or Turkey—that obfuscate their transactions through shell companies in order to evade sanctions.^{[19][20][21][22][23][24]}

Chairman of the Joint Chiefs of Staff Gen. Dan Caine stated in early April 2026 that Epic Fury had struck every Iranian factory producing Shaheds and their guidance systems. Nevertheless, the decentralized production model has enabled Tehran to begin rebuilding its capacity almost immediately.^{[25][26]}

Component Category	Hardware/ Model	Manufacturer/ Vendor	Origin
Propulsion	MD-550 Piston Engine	Mado Company; Beijing Micropilot (BMP)	Iran China
Flight Control	SSPS-105 Servo Motors	Sarmad Electronic Sepahan Co.	Iran
Avionics	Microcontrollers & DSPs	Texas Instruments; NXP; Analog Devices	USA
Navigation	GNSS / GPS Modules	u-blox; Hemisphere GNSS	Switzerland USA
Power/ Signal	Rectifiers & Generators	Vishay Intertechnology; Aura Semiconductor	India

Shahed component manufacturers (2026)^[27]

Russia

In November 2022, Moscow and Tehran struck a deal to franchise Shahed production at the Alabuga Special Economic Zone (SEZ) in Russia’s Tatarstan, a move that has enhanced the Kremlin’s intensive use of OWA drones in its ongoing invasion of Ukraine. The \$1.75 billion agreement included 6,000 Shahed-136 kits (assembly required) as well as licensing, technology, and 600,000 training hours. Russia hoped to localize at least 90% of its UAV production and assemble the units by September 2025.^{[28][29]}

In 2023, the Alabuga SEZ had 80,000 square meters of warehouse space, where 300 workers produced 2,738 Shahed drones in a year.^{[30][31]} By late 2025, Alabuga’s operations had expanded to more than 2.82 million

million square meters, and its 41,000 workers could output 5,000–6,000 drones per month. Per Ukrainian military leaders, the SEZ planned to surge production to 1,000 per day.^{[32][33]} Due to Russia’s domestic labor shortage, Alabuga relies on low-skill labor from local students and foreign workers, including potentially thousands of North Koreans through an agreement with Pyongyang.^[34] As of April 2026, Alabuga SEZ could house roughly 71,000 workers.^[35]

To streamline the transportation of critical Shahed components from Chinese suppliers, Russia and China jointly established the Deng Xiaoping Logistics Complex in Alabuga SEZ in September 2024, and they also established an airbridge between Naberezhnye Chelny Begishevo Airport in Tatarstan and China’s Urumqi Airport.^{[36][37]}

This centralized, domestic production model has advantages for Russia—a lower per-unit cost (\$70,000 rather than \$200,000), increased supply, and less risk of transport spoilage.^{[38][39]} Iran also benefits—Russia shares R&D and performance data about platform modifications, such as navigation systems, anti-jamming technology, and AI computing. Evidence shows Iran used these upgraded drones in its March 2026 strikes on US military bases and other Gulf targets.^{[40][41]}

The rapid expansion at Alabuga combined with the 2023 opening of an additional production line in Izhevsk, Udmurt Republic, suggest Russia will continue to build its domestic OWA drone supply and may look to export Shahed-type drones and hardware.^{[42][43]}

A Model for the Rest of the World

While drone warfare may replace everything from traditional surveillance to fighter aircraft, OWA systems like the Shahed may be its most effective and impactful use case, with implications that reach far beyond today’s battlefields. The Iranian and Russian production models provide a blueprint to states or actors interested in developing proven, resilient, and efficient offensive weapons capabilities.

Given the simplicity of the Shahed-style systems, low-skill labor requirements, and commercially accessible components, it is not difficult to imagine actors replicating these models. Alabuga clearly demonstrates the efficiency of centralized production by a high-capacity state. At the same time, Iran’s decentralized operation illustrates that total elimination is difficult, as evidenced by its ongoing Shahed output despite multiple attacks on its Isfahan production plant.^{[44][45][46]}

Russia is playing an active role in helping its partners manufacture Shahed systems, with China and North Korea likely candidates for future production sites. Russia is reportedly helping China develop its own Shahed clone—the Sunflower 200—and training North Korean workers at Alabuga.^{[47][48]} Iran has also explored setting up foreign factories, potentially in Belarus, according to a 2023 Institute for the Study of War analysis.^[49]

Beyond infrastructure, the drone manufacturing machine can become more robust and resilient if future Shahed production deals include intelligence sharing like the Moscow-Tehran agreement for Alabuga. This franchise model supports a unique “proliferation feedback loop,” accelerating technology diffusion and ultimately propelling a global drone arms race.^{[50][51][52]} Its effectiveness also serves as a strong signal to Western manufacturers to accelerate their own Shahed-style clone developments.^{[53][54]}

Sanctions notwithstanding, willing suppliers and potential producers are unlikely to limit the proliferation of Shahed technology and components. Moreover, the allure for actors to expedite production and deployment of thousands of OWA drones is both destabilizing and within the realm of probability.

The risk calculus for Shahed proliferation may change if allies develop low-cost, reliable counter-UAV tactics and enforce export controls on key technology. For now, Chinese replacements for sanctioned technology are frequently less effective than Western hardware; meanwhile, the limiting factor for production at Alabuga is likely hardware (e.g., MD-550 engine).^{[55][56]}

Regardless, countering a globalized OWA proliferation threat will require cooperation and learning among allied forces. Ukraine offers examples for how to resist drone-centric campaigns—e.g., deploying swarms of low-cost counter-UAVs rather than expensive missile interceptors, training a dedicated counter-UAV unit, and continuously adapting technology to meet adversary capabilities.^[57] These tactics have resulted in fewer Russian drone strikes, with April 2026 logging the Kremlin’s lowest OWA UAV hit rate into Ukraine in a year.^[58]

The Horizon of Drone Warfare

Drones have fundamentally changed modern warfare over the last decade by enabling smaller states and non-state actors to level the playing field and inflict heavy damage against adversaries at low cost. Recent innovations in the Shahed supply chain are bellwethers for the future of drone warfare.

The internationally reproducible franchising model for Shahed-136 production combined with drone customizations under development by Russia, China, and North Korea represent a new stage of adversary cooperation and global proliferation. The consequences of this model go beyond global OWA drone inventories. Expanding Shahed production to Russia has led to faster technological innovation, greater intelligence sharing, and an enhanced economic architecture to evade sanctions.

Allied forces need to prepare for a future with more drones. Russia's battle-tested upgrades to the original Shahed design have spread beyond Ukraine into the Gulf and have the potential to make drone warfare deadlier. Iran’s resilient, decentralized drone supply and Russia’s ambitious output expansion make this point clearer than ever. Each new production line in this chain fortifies the entire system, driving home the urgent need for a comprehensive counter-drone strategy.

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