



Highlights of Institute Assessment of Alabuga Drone Documents, Supplied by Dalton Bennett at the *Washington Post*

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At the request of the *Washington Post*, the Institute analyzed a set of internal documents from the Russian JSC SEZ PPT “Alabuga,”¹ concerning its production of the Geran -2 military drones with the assistance of Iran. The *Washington Post* subsequently published its story, “[Inside the Russian Effort to Build 6,000 Attack Drones with Iran’s Help](#)” on August 17, 2023.

The Geran 2 is fundamentally a copy of the Shahed 136 drone, a kamikaze-type munition supplied in the hundreds by Iran to Russia for use against fixed Ukrainian targets, where its targets and routes are preprogrammed prior to launch. The Geran 2 is the Russian army’s most important combat drone outlined in the documents. The Russian Ministry of Defense has contracted with Alabuga to produce 6000 Geran 2 drones, sometimes in the documents called Geranium 2, in a two-and-half-year project, given as starting January 2, 2023, based on extensive Iranian assistance and transfer of technology to Russia (see Figure H1).

The available documents go to great length to describe supply-chain procurement, production capabilities, and manufacturing plans and processes. PowerPoint presentations describe in detail various military drones and their major components, supply-chain issues, production requirements and details about the manufacturing processes, as well as plans to create cover stories to disguise Alabuga’s production of Shahed 136 drones.

¹ JSC SEZ PPT Alabuga is a joint stock company where shareholders are 100 percent state-owned, with 66 percent Russian state and 34 percent Republic of Tatarstan. It controls the management company of the Alabuga Special Economic Zone (SEZ). The SEZ comprises 40 square kilometer in the Yelabuzhsky District of the Republic of Tatarstan, ten kilometers from Yelabuga. The nomenclature ППТ is translated in a letter to Iran written in English by Alabuga as PPT; others translate it as IPT. It stands for Russian designation as a type of industrial and production zone. The sites are rented for production purposes and there are many enterprises operating in the SEZ Alabuga, including international firms. Two of the industrial parks in Alabuga, created in 2015, are called “Sinergia” (Synergy) and “A Plus Park Alabuga.” The drone production facilities are in the Sinergia industrial park, where there are two types of modular buildings, Sinergia 1 and Sinergia 2, differing mainly as to the size of the modules. The drone production facilities are under direct JSC PPT SEZ Alabuga control. Background on the Alabuga SEZ in English can be found here: https://alabuga.ru/file.php?BLOCK_ID=159&ID=41478. The cover sheet is the same one appearing in a PowerPoint presentation on the production of the Geran drones.

The available documents appear coherent, and any inconsistencies can be explained as changes in plans as the project developed and became focused on the assembly and production of the Shahed 136 drone. Further, details contained in the documents, including names of individuals and the name of the buildings and their size, are consistent with open-source information on Iranian drones and Alabuga SEZ (Alabuga SEZ website and press releases, previous Institute reporting, and a White House press release). As such, the available documents appear authentic and seem to be internal Alabuga documents or in one case correspondence to Iran.

In the first stage of fulfilling its contract with the Russian army, Alabuga would assemble fully made, but disassembled drones, shipped from Iran, and then transition in the second stage to assembling drones from airframes, aka containers or hulls, made on site, while Iran continues to provide the technology, expertise, engine, high explosive warhead, avionics, and other drone components, as well as operational training. Simultaneously, in stage 3, Alabuga would acquire and install additional manufacturing equipment and expertise with the goal of establishing a majority (80 percent) localized production capability at Alabuga. Components that would still be needed from other suppliers at that point in time appear to include many of the electronic components, connectors, GPS, inertial navigation systems (INS), field programmable gate arrays (FPGAs), accelerometers, and other subcomponents.

The Ministry of Defense contract lays out Alabuga’s expected production schedule of Geran 2 drones. Figure H.1 shows cumulative Geran 2 production, from early 2023 until the contract end. The graph shows how the drones produced in the three distinct stages add up over time to 6000 drones produced by September 2025.

Total Number of Shahed Drones Produced at Alabuga Over Time, According to Gantt Diagram with One Month Delay

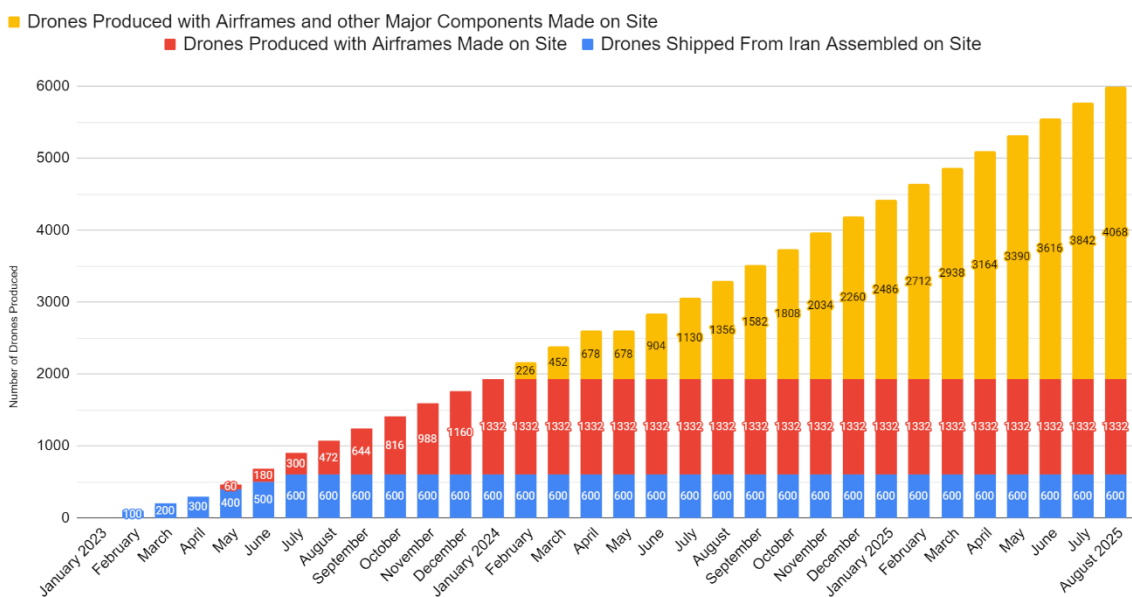


Figure H.1. Cumulative number of Geran 2 drones slated for delivery by Alabuga under its contract with Russia’s Ministry of Defense.

As of July/August 2023, Alabuga may have commenced production of drones from locally made airframes, with other major components provided by Iran, with up to 300 drones produced. This is in addition to up to 600 fully made drones delivered by Iran and assembled by Alabuga. These newly produced drones may have been recently delivered or may be ready to be delivered to the Army. Suggesting a recent or impending delivery, Alabuga planning documents called for the start of a quality control department (known as OTK) in July 2023. Russian defense enterprises routinely have such departments to ensure that the products meet military standards.

A recent intelligence assessment produced by Kyiv in July and obtained by *The Washington Post* in its report today states that over 600 Shahed 136 drones have been used in the last three months, suggesting that at least the assembled Shahed 136 drones have already been used by Russia.

A recent report by Conflict Armament Research assesses that Russia has begun “producing and fielding its own domestic version of the Shahed 136” and has already used it in combat missions in Ukraine in July 2023.² The ability to deploy Shahed drones made in Russia, at least those assembled or repaired in Russia, is a finding that lines up with information in the documents. The deployment of a “domestic” version, however, would indicate the project is months ahead of its schedule. Thus, further analysis is needed to eliminate the case that the changes in design found in the recently downed drones reflect Iranian variations in their own Shahed 136 drones or are repaired Shahed 136 drones, since Iran delivered many damaged Shahed drones to Alabuga under the contract to supply 600 of them. Institute findings from the documents assist this analysis by providing information on Iranian variations Russia identified and specific changes Russia was planning to make to the drone production.

Based on the information in the documents, Alabuga knew little about drones. As a result it partnered with Iran. Without Iran, Alabuga would not be able to produce the drone systems – it would fail.

The documents show that Alabuga has required extensive assistance to establish the necessary production, manufacturing, and quality control required to build the Shahed 136 drone. It has also been highly dependent on Iran, requiring extensive assistance, including the supply of designs, of all the components, avionic parts, motors, and warheads, and information about production, component and airframe manufacturing, and quality control required to build copies of the Shahed 136 drones.

The February spreadsheet, under Education, also lists that “at least 100 students and 10 staff” were sent for two months of training as part of the process of making the airframe. The training started on March 3, 2023, and finished on May 2, 2023. *The Washington Post* reported that by

² Conflict Armament Research, “Field Dispatch, Documenting the Domestic Russian Variant of the Shahed UAV,” August 2023.

the end of spring 2023, “an estimated 200 employees and 100 students had received training at the Iranian facilities,” citing the documents and an individual involved in the work at Alabuga.

One of the documents introduces the topic of possible cover stories. Alabuga appears to have chosen motorboats as the main cover to disguise and hide its production of Shahed drones and is using that terminology in the documentation, albeit not consistently. The Institute conducted several checks within the documents, such as on a component list, to test the attempted cover story. It is a workable cover for many components; however, we found several components that were explicitly for aerial vehicles and not for boats. But there is a more fundamental problem with this cover story. It entails accepting that Alabuga is spending huge sums of money to create a “motor boat” factory, using an engine with a 100-hour lifetime and requiring servicing after 25 hours, according to its own documents, when boat engines typically last at least 2,000-3,000 hours before they need major maintenance. Who would buy an Alabuga motorboat? Would any prospective customer believe it needed advanced electronics in the boat?

The Institute also checked whether the documents show that Iran is the major supplier. Alabuga used code names to hide the supplier, but numerous examples revealed Iran as the technology holder and principal supplier, including a component list that identifies Iran as supplying the drone’s payload.

The documents make it harder for Iran to wage its disinformation campaign that it is not aiding Alabuga or Russia’s military effort in Ukraine. The documents provide concrete, unclassified evidence that Iran is violating UN Security Council resolution 2231.

The documents demonstrate that over the next year or so, Russia has a credible way of building a capability to go from periodically launching tens of imported Shahed 136 kamikaze drones against Ukrainian targets to more regularly attacking with hundreds of kamikaze drones.

Based on a document with extensive questions to the Iranians, the Russians appear interested in developing the capability to coordinate the drones in a swarm attack, which could wreak havoc within Ukrainian civilian areas and against military targets. So far, Iran has not shown an ability to do this with the Shahed drones, which can be launched in barrages, like artillery fire, but are independently preprogrammed to hit a fixed target.

Alabuga’s project to make Shahed 136 drones, as described in the available documents, appears feasible, although it has vulnerabilities that could disrupt its ability to fulfill its contract to supply 6000 of them, or at least delay the fulfillment.

Based on the information in Alabuga internal personnel documents, there is doubt about its ability to reach its desired staffing levels. According to an Alabuga PowerPoint presentation and an Excel document, the process lacks significant numbers of personnel. As of the date of the documentation, which is early 2023, almost 75 percent of the positions were vacant, especially leadership positions and their associated departments, and all production areas had

much less than 50 percent of the “required” personnel. Conscriptions and staff departures have complicated Alabuga’s personnel situation.

According to the *Washington Post*, Alabuga has at times shown desperation to increase its staff, recruiting foreign workers and young women on Telegram. It is reportedly recruiting underage students, often between the ages of 15 and 18 from the adjacent Polytech training center, and subjecting them to harsh and demanding working conditions.³

The project faced delays in its early stage. Iran failed to provide airframe designs as requested by Alabuga, which seems to have caused a delay in the planned assembly of drones, initially set for April 2023, by at least one month. Additional delays in setting up necessary production capabilities may have already resulted in setbacks in production and delivery to the Army. As a result, the project may not be able to meet the July 2025 target; if so, Alabuga may need to rely on additional imports of major components from Iran to make up for delays in domestic production of critical components including engines, navigation systems, and warheads. Further delays could be caused by procurement shortages, personnel shortages, or problems in reverse engineering the Iranian manufacturing processes.

Initial Alabuga plans in the fall of 2022 were not realized. Later documents show that the timeframe was amended as well; rather than delivering 6000 Shahed drones by January 2025, they would be ready later, by September 2025. Combined, it indicates a mismatch in Alabuga’s ambitions and actual capability or customer interest.

Currently, Alabuga appears to depend heavily on Iran for key components, other than the frame and raw materials for the airframe and a few components made in Russia. With regards to over 130 electronic components, INS, accelerometers, GPS, FPGA, connectors, and other subcomponents listed in the documents as needed in the Geran 2 drone, four are identified in one of the documents as made in Russia. The rest are manufactured predominately by U.S. firms but also some by French/American, Japanese, Swiss, Taiwanese, Chinese, Dutch, and other suppliers. Well over 80 percent of the electronic parts, ignoring connectors, are manufactured by U.S. companies, and most of these are electronic integrated circuits made in only a few countries, but not Russia.

Alabuga wrote that its large raw materials requirements for carbon fiber and fiberglass for the frame could be satisfied by Russian suppliers. Two such suppliers have factories in the Alabuga SEZ. However, Alabuga expressed that long delivery times could be expected for certain required machine tools, and at one time raised concern about relying on timely deliveries from an unnamed “external supplier” for a specific type of binder. These types of procurement

³ Radio Free Europe, Radio Liberty, “A Russian Factory Is Using Underage Workers To Assemble Iranian ‘Suicide’ Drones Destined For Ukraine,” August 12, 2023, <https://www.rferl.org/a/russia-iran-suicide-drones-assembled-underage-students-ukraine/32545386.html>, based on reporting by *Protokol*, “Alabuga. Production of Death by the Hands of Students,” July 24, 2023, <https://protokol.band/2023/07/24/alabuga-rukami-studentov/>. This and earlier *Protokol* reports show that it received some of the same documents as did the Institute and has written some excellent reports.

delays could result in further delays in airframe production, perhaps the only drone component Russia was better set up to produce than Iran.

Russia is required to “Russify” Iran’s drone technology, meaning to incorporate Iran’s technology into Alabuga’s production methods. This has applied to designs, industrial practices, and software. This process was complicated by Iran’s outdated transfer of the technology and its rather poor production methods and standards as evident in already supplied drones. For example, Alabuga noted that some of Iran’s production practices had an extremely negative effect on the strength of the entire outer structure. In this Russification process, Alabuga engineers are standardizing and refining the components, improving their quality, and making the manufacturing process more efficient.

Alabuga’s success will require that it obtains adequate staffing and masters the production of the drone components, first, the manufacture of airframes. However, Alabuga, despite its weaknesses and lack of technology, shows a more modern industrial approach to building the drones than Iran has done. The information indicates that Alabuga believed Iran’s production methods tended to be outdated and deficient in modern industrial procedures, according to the *Washington Post*. So, if Alabuga gets all the necessary technology and succeeds in putting in place a capability to make thousands of the Geran 2 drones, those drones should be more reliable than the imported Iranian ones. Moreover, the documents imply that Alabuga is also creating the capability to improve the drones.

Procurement

Alabuga intends to indigenize 80 percent of the production of the drones on Russian soil, using roughly a one- and one- half-year timeline to establish the necessary supply chain, parts manufacturing, and personnel requirements to establish a production facility with the capability of producing thousands of drones. This indigenization will require extensive foreign procurements, involving hundreds of thousands of subcomponents. Alabuga can be expected to adjust which components it uses, depending on availability. Thus, the component lists in the documents, which are specific to individual manufacturers, should not be viewed as fixed. The list of suppliers could change as Alabuga goes to buy the subcomponents, faces obstacles, and needs to make substitutions. In fact, the documents reveal that Alabuga is seeking to find qualified manufacturers in Russia, Iran, and China for those components. For some electronic components, that may not be possible, however.

The procurement of equipment and machine tools for indigenizing production is ongoing, but its success is not guaranteed. This is a vulnerability in Alabuga achieving its goal of supplying 6000 Geran 2 drones.

The available procurement lists are consistent with previous information on components derived from downed drones, although the newly available lists are far more detailed than others available publicly and are tied directly to Iranian input into component lists for the Shahed avionic and power components. For the main electronics-based drone components,

such as navigation, air data processing units, and flight control units, which have been assembled by Iran, the documents list their subcomponents. None of the items appear to be listed on the U.S. Commerce Control list that controls the export of listed items due to technical specification and potential for military and civilian applications. Although the items may not be listed, they are falling under broad U.S. export restrictions of many, if not all, items under Harmonized System (HS) Chapters 84 and 85, and many in 90. HS codes are commonly assigned throughout the export process for goods and are a standardized numerical method of classifying traded products. Chapters 84 and 85 cover the most important electronic items Iran needs for its drones. The European Union has broadened the items it is controlling for export to Russia, including a wide range of electronics, but absent blanket bans on all goods under HS Chapters 84 and 85, it is difficult to judge whether the current restrictions sufficiently cover the wide range of electronics Russia needs for the Shahed production. Blanket restrictions on entire HS Chapters would be easier for customs agencies in transshipment countries to enforce.

A question that remains is how easily accessible the necessary electronics are on the global marketplace, with a majority of the electronics listed in the Excel sheet originating in Western or allied countries; a question that Alabuga also tried to answer. Which electronic components can be bought from online distributors. Which can be bought globally from authorized distributors? What role do secondary markets play? Many of the electronic components listed in an Excel spreadsheet appear to be readily available through both authorized distributors and manufacturers, but also online marketplaces such as Mouser and Digikey, both identified in the Alabuga documents. But can Alabuga acquire the vast number of subcomponents necessary?

With each drone containing over 130 electronic-based subcomponents and connectors, Alabuga or Iran will need to acquire hundreds of thousands of electronic components from suppliers for distributors. If Alabuga builds 5400 drones (ignoring the 600 that have already come from Iran in a disassembled form), and utilizing Alabuga's own parts list, for example, Alabuga needs over 700,000 electronic and guidance components, connectors, accelerometers, INS, and other parts.

Many of the electronic parts are sophisticated electronic integrated circuits made in only a few countries, but not Russia. Alabuga or Iran will need to import huge numbers of these electronic integrated circuits—about 320,000 will be needed for 5400 Geran 2 drones over the next two years, if Alabuga is to stick to its schedule.

There are additional high-quality components that Iran and Russia may seek from other countries, including ball bearings for the engine. An Alabuga document on the MADDO engine includes Iranian procurement information and states that ball bearings are European, spark plugs are from China, and high voltage wires are from the Japanese company NGK.

It is known that Alabuga has a procurement office, but its activities are not described in the available documents. Nonetheless, the documents contain discussion about setting up supply channels for parts, and, as mentioned above, the documents include some discussion on the initial thinking about replacing harder-to-obtain parts with equivalent, or what are called in the

documents, “analogs.” The general approach is to seek to replace Western suppliers, who, for example, comprise the bulk of the electronic components, with suppliers in Russia, Iran, and China. It remains to be seen whether this strategy will work, but it is another reason to strengthen and better enforce sanctions and trade controls on those three countries to complicate and disrupt Alabuga’s transition to more indigenous production. The documentation implies that procurement is a vulnerability in fulfilling the defense contract and obtaining additional ones. For example, Shahed 136 drone production would not be possible in the near-term without Iranian supply of many parts, which in turn are composed of many non-Iranian, illicitly procured subcomponents.

The high explosive and initiation components of the “boat,” called “bumper” or “eco-bumper,” and “accelerator,” are to be initially produced in Iran. The “bumper” appears to be a codeword for “warhead,” while the “accelerator” appears to be the explosive initiator. The available documents do not explain Alabuga’s procedures for the safe handling of the warheads delivered by Iran, whether the warhead is kept separate from the drone body until it is launched or Alabuga attaches it to the drone body at its factory. In any case, Alabuga plans to establish a capability to make the warheads by late spring 2024.

Recommendations

The extensive list of components, created by Alabuga with Iranian data, uncovers Alabuga’s (and Iran’s) dependence on successfully obtaining from abroad manufacturing equipment, electronic parts, and other items. Many of the electronic components are made exclusively in the West and Japan, and not in Russia or Iran. The information in these documents should instigate the development of strategies to make it harder for Alabuga (and Iran) to succeed in acquiring these items, including opportunities to disrupt Russia’s and Iran’s efforts to create covert supply channels. Governments can create more precise information about which specific parts and in what quantities Alabuga needs, allowing for more targeted warnings to customs agencies, other governments, manufacturers, distributors, and logistic and transportation providers.

Possible steps include, but are not limited to: revealing more information about Alabuga and Iran’s project; sanctioning key Iranian and Russian companies, officials, and banks; government outreach to all named suppliers and main distributors (except Iranians); threatening companies and especially distributors facilitating the procurements with secondary sanctions; and listing additional items as prohibited if not already banned for Russia and Iran. However, with regards to electronic components and associated manufacturing equipment, it is essential to follow the U.S. government lead and ban whole families of electronics, as classified under Harmonized System (HS) Codes.

With all the components and manufacturing equipment needed by Alabuga, responsible suppliers have an opportunity and an obligation to do more in order to create bottlenecks in Alabuga’s and Russia’s manufacturing plans. Supplier companies need to be vigilant in knowing their customers and alert that Russian companies are actively seeking parts for drones and

other deadly weapons systems. The ease at which proliferant actors can establish front companies in Russia or “friendly” countries compounds the issue and demands greater due diligence from manufacturers and suppliers. When manufacturers and suppliers turn a blind eye or fail to follow through on their basic due diligence, U.S. and allies’ national security is diminished, and Ukrainians pay the price with their lives.

Because the documents provide concrete evidence that Iran is violating UNSC resolution 2231, Iran’s actions should be discussed and condemned at the UN Security Council as it deliberates Iran’s compliance with resolution 2231. They also serve as an important justification to prevent the lifting of the missile embargo in the resolution that would otherwise take place in October 2023. This would prevent any international legitimization of Iran’s drone trade with Russia.

In trying to prevent Alabuga from succeeding and discouraging Iran from aiding, the public revelations of these documents help shine a useful spotlight on this dangerous development and motivate governments to do more to stop Alabuga and Iran from succeeding. The revelation of these documents and the *Washington Post*’s reporting on them is a great public service to international security.