

Review of the F-313 Qaher, the new Iranian stealth jet

By: Dino Ramzy

The Iranian media revealed Iran's newest military jet project, the F-313 Qaher, in a public unveiling on February 2013 as part of the Ten-Day Dawn ceremonies held in Iran to celebrate the 1979's victory of the Islamic Revolution and attended by President Mahmoud Ahmadinejad.

In the previous days, the Iranian Defense Minister Brigadier General Ahmad Vahidi had said, "The aircraft will be different from the other fighter jets Iran has already made." According to Iran's AIO (Aviation Industries Organization) the F-313 Qaher is an indigenous Iranian design using three-dimensional interactive design software and tested using simulation software, fluent flow analysis, CFD models and that they have additionally tested the aerodynamics using small sized jet and propeller flying models before the public unveiling. The Iranian aeronautical industry did indeed achieve a significant leap forward in recent years and the F-313, although



not the only claimed indigenous design, is by far the most ambitious to date. The Iranian capabilities can't tackle the more sophisticated parts of a military jet such as the radar or the engines, however, Iran has the General Electric J85s (which it uses on their Saeqa I and II domestic combat jets) as well as a dozen other jet engines as a result of old Northrop F-5s and other American aircraft in its inventory from pre-1979 as well as newer engines from Russia and China, also Iran builds various turbo fan engines for its indigenously made line of UAVs (Unmanned Aerial Vehicles). Indeed, based on the available photographs of the F-313, the new stealthy jet has a really peculiar design which sparked a controversy among the experts. First, I'm going to quote what was released by Iranian MEHR News Agency on February 4th, 2013, a couple of days after the entire world highlighted the oddities of the first prototype of its F-313 Qaher stealth fighter jet and the reasons why the F-313 will never get off the ground:

The top 10 technical characteristics of the F-313 fighter jet and some of the related data on its features and appearance:

- 1- Using Two inlets and inlet ducts make up the air induction system to deliver air to the engine. Due to an indirect angle of the engine to the air inlets, the radar reflectivity is reduced, and it makes angled design of inlet ducts to the surface to get radar energy wave, just like in F35.
- 2- The hot exhaust gas mixes with cold air through the inlet ducts, and gets cooler before it gets out of the exhaust system, to reduce heat effects on the surface of the aircraft.

- 3- Use of radar-absorbent materials in the body, to absorb wave energy and reduce radar reflection, for greater stealth effect of Qaher F-313 fighter.
- 4- Considering the estimated length and height of the aircraft is less than 16 and 4 meter, the two compartments with payload capacity of carrying two 2000 pound bombs, or greater number of smaller smart guided missiles, or at least 6 air-to-air missiles in the category of R-17 or PL-12.
- 5- Relatively large vertical tail surface has created favorable directional stability and with canted vertical tails create aerodynamic benefits as well specific appropriate lateral maneuvering capabilities.
- 6- The very large canopy gives a 360 degree visibility, which is essential for low altitude fly-by flights, especially helps ground mission attacks, and it is also very useful in close dog-fights.
- 7- The angled wings is perfect example of indigenous design for aircrafts, which gives a side profile like M, and similar to a W profile, is the best form to use in aircrafts.
- 8- Single-cycle landing gear is another proof that F-313 is a light weight aircraft, with minimum flying weight of 12 to 14 ton, and maximum flying weight of 20 ton.
- 9- There are 8 analog displays in the cockpit, which shows Multi-Function Display (MFD) technology has more room to improve in F-313, Qaher fighter jet.
- 10- Considering F-313 normal steering lever, the control systems, with the wing movable surfaces, rudder, and vertical stabilizer are hydraulics, and not fly-by-wire (FBW) system, since many today's aircraft use "side-steering lever" control.

The advance computer designing software (CATIA) were used for designing F-313, and aerodynamic analysis methods such as computational fluid dynamics (CFD) also were used, with the help of numerical grid generation software (GAMBIT), flow analysis software (FLUENT) and other design computation software, which shows a complete scientific work in various areas of indigenous scientific and technology was used for F-313.

Now, let me explain, from my own point of view why the F-313 sparked so much controversy to the point where it was described by many experts to be just a hoax, and not an elaborate one for that matter, also the claim that such a design can never fly as a combat-capable jet.

- 1- The general shape of the plane is controversial, with resemblance to a number of old USA prototypes such as the X-32, the X-36, and the Boeing Bird of Prey stealth project of the 1990s. Still, the wings with outer section canted downward seem to be a bit too small to sustain the weight of the aircraft, also the whole body of the plane lacks the characteristic rivets and bolts all aircraft, including stealthy ones have.
- 2- The F-313 canopy appears in the released pictures not to be transparent enough for a combat jet, looks more like plexy-glass, it would simply be unacceptable in any kind of plane.

3- The cockpit is simply too primitive and looks more like ones you find in a small private plane. Also the front panel lacks the typical wirings. Some experts have noticed the airspeed indicator is limited to 300 MPH, and that it looks more like something put together in a haste for the benefit of the news cameras covering the event. Also the general size of the cockpit is too small for a normal size pilot and would be uncomfortable for a combat pilot flying a combat jet.



4- The F-313 wings and its canted wing-device are simply too small to carry the weight of combat necessary ordinance, it lacks enough room for enough hard-points on those wings and the released pictures don't show any internal bays to carry the weapons internally as it is common with all stealthy aircrafts.

5- The air intakes inlets are located above the fixed canards and are too small, in high AoA (Angle of Attack) they would get turbulent or no air at all, something that is unrealistic for a combat jet of any kind but more consistent with non-combat drones as they require much less maneuverability.

6- The engine lacks a nozzle, which can result in a catastrophic melt of the rear part of the fuselage when flying, not to mention it lacks the s-shape usually used on stealth aircrafts to hide the engine's IR (Infra-Red) signature.

7- The nose section of the plane is way too small to accommodate a modern radar.

In conclusion, the F-313 pictures as shown by the Iranian media resemble a smaller plastic mock-up, most likely not of a flying example, and the Iranian military has done such a thing before, shown pictures of a combat jet, the "Shafaq" that was said to be in the final testing stages and about to go into production by 2008 and nothing came of it, although the mock-up shown for the Sharaq was a more viable one than that of the F-313. The model seen for the F-313 could just be indeed a non-flying scaled-down mock-up, and the production model might be bigger, with a larger nose Radom to accommodate a modern radar, realistic and functioning air-intakes, a real canopy and of bigger size with engine nozzles or even a s-shaped heat dissipating engine outlets and the capability to carry combat ordinance internally and even externally on hard-points. The design does show advanced stealth features and it could be capable of high maneuverability and it shows a good potential for an effective interceptor. Iran does need a modern defensive interceptor that gives them a tactical edge, especially with the growing capabilities of the Gulf States Air Forces and their continuous procurement of state of the art combat jets and Israel's upcoming acquisition of the F-35 stealth fighter, the F-313 could prove a valuable and much needed asset to counter it. Although the F-313 resembles a drone more than a viable flying combat jet, it shows potential, and with some foreign technical assistance and enough money, such a project might see the light of day at some point in the near future.