

# 'Sky Sonic': Israel's Rafael developing anti-hypersonic missile for combat

Russia, China, and Iran have all made various claims about possessing or working on developing hypersonic missiles for combat.



The Spike anti-tank missile, made by Israeli defense contractor Rafael.

(photo credit: DEFENSE MINISTRY)

## Background and Types of Hypersonic Missile

[On June 6, 2023](#), Iran launched what it claims is its first hypersonic missile produced domestically, which alarmed Israel. Iran had previously stated that it could strike Israel within 400 seconds. The Iranian president, Ebrahim Raisi, was present at the unveiling of the Fattah, or “conqueror” in Farsi, missile. Iran claims that the missile has a range of 1,400 kilometres (870 miles), the ability to travel at 15 times the speed of sound, and the capability to evade air defence systems.

[A military expert](#) from the region who did not wish to be quoted told EurAsian Times, “In the dearth of any substantial evidence, it is hard to believe that they have a sophisticated technology that even the most technologically advanced countries are struggling with. Tehran is bluffing or highly exaggerating its capabilities. It is more of an ‘info war’ just like we see between Russia and Ukraine.”

The question remains as to why the [defense against hypersonic missiles](#) has become a vitally important matter for Israel. As an example of the threat posed by such a weapon, the operational use of maneuvering hypersonic missiles by Russia in the war in Ukraine has demonstrated its inherent hazard. Hypersonic missiles travel on an aerodynamic trajectory at

a speed that is 5-10 times the speed of sound (Mach 5-10) and have excellent navigation and maneuvering capabilities that make it difficult to detect and track their trajectory, and consequently to intercept them. These missiles can carry both conventional and nuclear warheads, and can strike moving targets with great precision.

Some qualities related to the performance of hypersonic missiles include: (1) alleviating heat from the missile's shell while in flight; (2) the ability of the engine's components to withstand high temperatures and pressures; and (3) problems related to control and navigation. It would appear that the Russians have overcome these problems and have developed a missile with long range and controlled flight: unlike a ballistic missile, whose ability to maneuver to a target is limited as it travels on a predetermined ballistic trajectory, the trajectory of a hypersonic missile can be controlled in flight, thus improving the capacity to hit a target with greater precision. Moreover, a hypersonic missile can carry a nuclear warhead.

### Maneuverability of Hypersonic Missiles

(1) Hypersonic glide vehicle (HGV) also known as tactical boost glide (TBG) is launched from a strategic or tactical ballistic missile. A ballistic missile or an aircraft carries the hypersonic missile and determines the speed of the hypersonic missile. Once it exits the atmosphere (at a height of 80,000 feet), the hypersonic missile gains speed – in the range of Mach 20-25. With time, the missile proceeds at lower hypersonic speeds (but still above Mach 5), which enables it to improve its maneuvering capabilities. The navigation and maneuverability render the hypersonic vehicle a weapon system that is difficult to detect and intercept. Its great speed shortens the amount of time available for the interceptor to detect it ([Figure 1](#)).

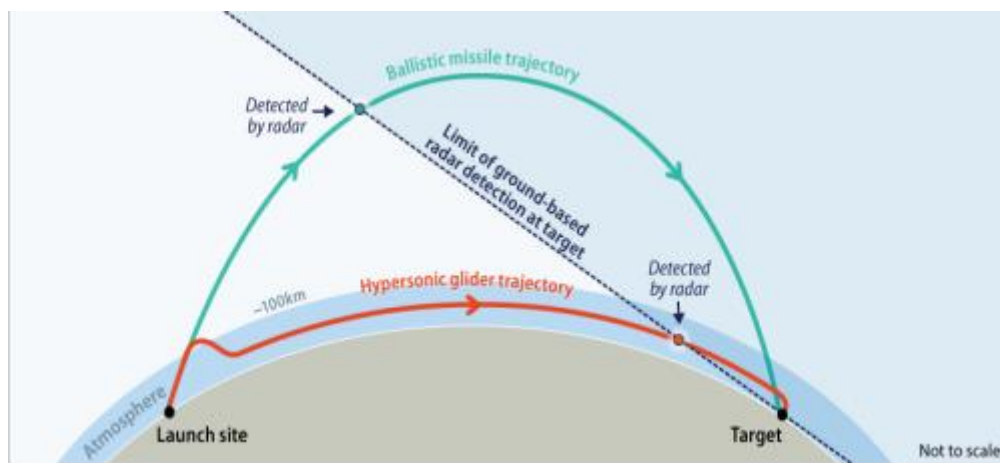


Figure 1 – Radar detection of ballistic missile vis-à-vis radar detection of hypersonic glider

(2) [Hypersonic cruise missile](#) (HCM) combines the acceleration capabilities of a ballistic missile with the maneuverability of a cruise missile and is equipped with a powerful engine. HCM is launched from an aircraft. For example, according to reports, the American hypersonic missile AGM-183-ARRW, which is carried by a B-52 bomber, can reach a speed of 6,200 km/h.

A hypersonic cruise missile is an air-breathing type of missile (Hypersonic Air-breathing Weapon Concept – [HAWC](#)). HAWC was designed to provide an offensive system that operates at hypersonic speeds.

HAWC is an air-to-air combat missile concept tested for the Defense Advanced Research Projects Agency ([DARPA](#)) and the US Air Force (USAF).

The engine of a hypersonic cruise missile takes in air at high pressure and supersonic speed in order to provide oxygen needed for burning the fuel (Zheng, 2007<sup>1</sup>). This is a self-powered oxygen supply, where the compression of the fuel and air is achieved by the movement of the missile.

### 'Sky Sonic'- Israel's Rafael has developed anti-hypersonic missile for combat

On June 14, 2023, [Rafael Advanced Defense Systems](#) announced that it is midstream in working on developing a system to shoot down hypersonic missiles, dubbing its new project the “Sky Sonic” system.

Rafael clarified the unique threat posed by hypersonic missiles, which would involve the ability to drop from the top of their trajectory in multiple hops, unlike the ballistic missiles which go high up into the atmosphere in a relatively straight line and come back down in a similar straight line.

Rafael’s Chairman (CEO) Yuval Steinitz said that the current era has more of a focus on the threat posed by hypersonic missiles. According to Steinitz, the new danger posed by such missiles is not limited to their speed (beyond Mach 10 – hypersonic), but rather, it is enhanced by their ability to maneuver and alter their trajectory in order to avoid destruction. The CEO emphasized the versatility of Sky Sonic as reflected in its ability to “[hit all hypersonic missiles](#), flying high or low, maneuvering more or less.”

### Conclusion

According to Steinitz, Rafael had hit a new high of NIS 40 billion in sales over the last year, a huge spike following the Russian invasion of Ukraine. Furthermore, Rafael plans to market Sky Sonic at the upcoming [Paris Air Show](#), as it targets the European market.

Steinitz said that Europe watched the Russia-Ukraine war and realized that most of the attacks at a certain point were carried out by firing missiles, including Moscow’s claim that it was firing hypersonic missiles. This meant new opportunities for Rafael in sales to European countries.

Rafael will also showcase its other systems at the [Paris Air Show](#). These will include Iron Dome and David’s sling. In addition, Rafael will also be discussing Iron Beam, the laser air defense system that is being coupled with Iron Dome. This system is supposed to be operational in the near-future. The company says the “system delivers unparalleled accuracy in intercepting rockets, mortar projectiles, missiles, unmanned aerial vehicles (UAVs), and UAV swarms from several kilometers to a few hundred meters away. As an integral part of the comprehensive Iron Dome air defense system, the Iron Beam significantly enhances its defensive capabilities.”

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<sup>1</sup> Zheng, X.-M., Xu, D.-J., Cai, G. B. "Preliminary study on hypersonic airbreathing engine performance," *Hangkong Xuebao/Acta Aeronautica Sinica*, 2007, 28 (suppl.), pp. 35-41.