Prospects of Agni-5 bunker-buster missile

Introduction

After the United States (US) used GBU-57/A Massive Ordnance Penetrators on 22 Jun 2025 to attack Iran's Fordow nuclear complex, it is now being reported that a modified Agni-5 Intercontinental Ballistic Missile with a reduced range of 2,500 kms is being developed by the Defence Research and Development Organisation. This version will be a conventional weapon with a huge bunker-buster warhead and is anticipated to reach 80–100 m below the ground surface before getting detonated. India is developing this bunker-buster to be missile-delivered, providing a more adaptable and economical platform than the US, which relies on costly bombers for delivery.[1] This development points towards India's preparedness to counter Pakistan's threats and nuclear sabre-rattling which often aims to attack India with nuclear weapons at the drop of a hat.

Expected capabilities of modified Agni-5

The bunker-buster variant of Agni-5 will have a high density hardened casing, a delayed-action fuse that amplifies destructive shockwaves in subterranean structures and advanced guidance systems like the NAVIC navigation and ring-laser gyroscope. It is expected to be a canister launched missile which could be deployed from road mobile launchers and could be transported via trains.[2] The Agni-5 missile's bunker-buster variant may fly between 9,878 and 24,696 kilometres per hour (kmph) against adversary targets.[3]

It must be clarified that the above velocity will only be achieved in the terminal phase of the missile and not in the boost or mid-course phase. Two new Agni-5 variants are being developed. The first will include an airburst warhead for targets above ground like radar stations and other military installations. The other will be a deep-penetrating missile that is intended to burrow into reinforced underground infrastructure. With a maximum weight of 7.5-8 tonnes each and speeds between Mach 8 and Mach 20, they are expected to be among the most potent conventional hypersonic warheads in the world.[4]

Applications of bunker-buster warhead

There could be a number of tactical and strategic applications of Agni-5 bunker-buster variant for India. Pakistan keeps ammo stockpiles and reinforced command centres close to the border, and this missile could destroy those in a conflict. To lessen chances of retaliation, India may employ bunker-busters to pre-emptively destroy adversary missile silos or nuclear storage facilities. Further, the sheer presence of such a capability could

prevent India's rivals from depending on underground facilities, changing the strategic balance. Such missiles would provide India with a clear advantage in the Himalayas, where topography encourages tunnelling and subterranean shelters.[5]

One significant benefit of these traditional deep-strike bunker-buster weapons is that they reduce the possibility of an escalation. They have same devastating force as nuclear strikes, but they do not have same moral, political, or strategic repercussions. This establishes a new, intermediate rung in the escalation ladder, giving policymakers with flexible reaction options during conflicts.[6]

Missile trajectory parameters

Suppose the modified Agni-5 upper stage with warhead is flying at a lofted angle of 75 degrees (with a launch height of 2 m) and a boost velocity of Mach 20 or 6,860 meters per second in exo-atmospheric conditions, then the approximate final range of the missile will be 2,398 kms, maximum height as 2,237 kms and total time of flight as 1,350 seconds. If one need to achieve the maximum reduced range of 2,500 kms, then the missile would have to recalibrate at an angle of 15.7 degrees outside the atmosphere with 6,604 as horizontal velocity and 1,856 as vertical velocity during the mid-course phase itself. Then only the perfect range of 2,500 kms is achieved. The total time for bunker-buster to reach its target will be approximately around 22 minutes and it will reach a maximum altitude of 2,237 kms during its mid-course phase.

Pakistan's reaction and future countermeasures

A leading strategic affairs specialist from Pakistan has expressed concern about what she describes as a 'Dangerous Shift' in India's military doctrine that has the potential to upset delicate balance of power in the region. She cautioned that using such a weapon could lead to a 'Hazardous Entanglement' between nuclear and conventional tactics. She contends that unintentional escalation may be caused by this missile that could damage command-and-control centres, which could also act as nuclear command posts. She added that an over-reaction is more likely if Pakistan's early warning systems are unable to differentiate between a conventional and nuclear Agni-5 bunker-buster missile.[7]

Pakistan can explore a number of countermeasures. Enhancing anti-ballistic missile system, which is already underway with a recent arms deal with China that included purchase of the Chinese HQ-19 anti-ballistic missile system—a mid-course interceptor that can target incoming ballistic threats—may be a crucial first step. When deployed, HQ-19

would greatly improve Pakistan's defences against Agni-5 and other high-altitude threats. Furthermore, Pakistan can hasten consolidation and hardening of its strategic infrastructure. 'Full Spectrum Deterrence' concept, which calls for a nuanced nuclear response to conventional or sub-conventional threats, may be strengthened by Pakistan. Therefore, the existence of Indian deep-strike conventional weapons may cause a nuclear threshold to be reached earlier than expected.[8]

Limitations

As India observe that the total flight time of modified Agni-5 missile could be around 22 minutes, and it also know that ballistic missiles are vulnerable to exo-atmospheric interception at mid-course (middle) or terminal (final) stage of a missile's trajectory[9], therefore, one can expect adversaries to use their countermeasure by firing of interceptor missiles for a hard kill. For Agni-5 to cover underground sites situated farther deep inside Pakistan, it has to be launched closer to the border of India due to its reduced range of 2,500 kms, which in turn carries the drawback of Pakistani radars and sensor's chances of picking and tracking missile trajectory. The US also has an unusual policy of siding with Pakistan during India's crisis times and can provide them with advanced Ballistic Missile Defence systems if uncertain geopolitics favour Pakistan, which is somewhat used by the US to irritate and unsettle India, often due to India-Russia robust relations and overall, India's rise, which the US cannot digest.

Top defence leaders and US officials have voiced scepticism regarding President Trump's assertions that Iran's nuclear facilities had been 'Totally Obliterated' in the recent bunker-buster strikes using B-2 bombers. Although the strikes caused 'Significant Damage' to Fordow, Natanz, and Isfahan sites, US Defence Intelligence Agency's preliminary evaluation stated that the facilities were not completely destroyed.[10] The effect was restricted to above-ground structures only, according to the assessment, and Iran's centrifuges were essentially intact and many of deep-subterranean facilities were spared the worst of bunker-buster explosions.[11]

Further, these bunker-buster bombs were created by the US utilising intelligence that was particularly collected for certain locations around the globe like in Middle East over a course of more than 15 years. In order to verify that the pressure blast could pass through tunnels and successfully destroy vital equipment buried beneath the ground, the US military carried out hundreds of trials on simulated underground sites. Thus, extensive testing has gone into perfecting these bombs.[12] Therefore, India would also need to invest in effective

intelligence to study the strength of the underground storage sites for a long period of time and also carry out multiple trials. Gathering such intelligence for Pakistan may be uncertain, but for China it will be a really hard effort and may not be possible, as the US has also not been able to assess the strength of Chinese silos and storage sites correctly till now.

Conclusion

The development of bunker-buster Agni-5 will certainly add more strength to India's aggressive posture, but it will not be developed overnight and will need longer trials and higher order intelligence on adversaries target locations before getting inducted with the end-user. From recent Iranian strikes, it is emerging that bunker-busters do cause massive damage to the overground structures, but causing great damage to structures underneath the ground is still doubtful, as revealed by the US intelligence reports. The US was able to fly B-2 bombers after the Israelis completely destroyed the air-defence capabilities of Iran. That luxury cannot be provided to India because both Pakistan and China have strong air-force and China in particular has a deep air-defence layer.

For Agni-5 bunker-buster to be truly effective against Pakistan in the future, India will need to completely neutralise Pakistan's interceptor air-defence network before any launch. Secondly, since its range will be limited to 2,500 kms, it will not be possible to strike Chinese sites located at far off distance beyond 2,500 kms. Any strike within the 2,500 kms range in China will definitely invite similar Chinese retaliation and India will need to prepare itself with robust air-defence to tackle that retaliation. In 'Operation Sindoor', ballistic missiles were not utilised, which could have provided more information about India and Pakistan's interception capabilities. Hence, although India is inspired by the US bunker-buster usage against Iranian nuclear sites, it remains to be seen whether such tactics could be achieved in the Pakistani and Chinese theatres as both of them possess starkly different military capabilities, which are much stronger and robust than Iran.

Endnotes:

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