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AGNI Prime – An Analysis

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The test of the indigenous Agni Prime (Agni P) demonstrates India's technical maturity. Agni missiles constitute the backbone of land-based nuclear deterrence of India.

Ministry of Defence in its press release of 28 June 2021 announced that "Defence Research and Development Organisation (DRDO) successfully flight tested a new generation nuclear capable ballistic missile, Agni P, from Dr APJ Abdul Kalam island off the coast of Odisha, Balasore at 1055 hrs on June 28, 2021".[1] It also stated that "various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile. The missile followed text book trajectory, meeting all mission objectives with high level of accuracy".[2] The test of the indigenous Agni Prime (Agni P) demonstrates India's technical maturity. Agni missiles constitute the backbone of land-based nuclear deterrence of India.

Amongst the current missiles available with India, it may be recalled that Agni-1 has a range of 800-900 km and early Agni was a hybrid of solid propellant first stage and liquid propellant second stage. Agni-2 is a solid propellant has a range of 2,500 km[3]; Agni-3 has a range of 3000 km and is a two-staged solid propelled ballistic missile, Agni-4 is nuclear capable has a range of 4000 Kms and Agni-5 is a three-stage solid propelled ballistic missile and has a range of 5000 kms with canisterised system.[4]

There are various speculations about Agni P. It is being debated whether it would be a replacement of Agni 1 and 2 missiles, or an addition to the existing missiles with advanced features and more accuracy. Agni P is the lightest, smallest and most agile missile in the Agni series. It is reported to be approximately 50 percent less in weight with more manoeuvrability and accuracy. It is propounded that this missile comes with "new composites, propulsion systems, innovative guidance and control mechanisms" along with advanced navigation systems.[5]

Canisterisation of Agni Prime

Evidently then, the technologies being used in Agni Prime are significantly upgraded. The MOD press release describes it as "a new generation advanced variant of Agni class of missiles" and "it is a canisterised missile with range capability between 1,000 and 2,000 kms".[6] The relevant feature to note here is that it is a canisterised missile, which can be launched from a road or rail platform. Canisterisation of missiles shortens the time required to launch them while improving their storage and mobility thus increasing the launch options.[7]

The encapsulated or canisterised system increases their state of readiness as the warhead is pre-mated to the delivery vehicle and "kept hermetically sealed for storage and transport".[8] As India's missiles mostly are based on solid fuel, canisterisation provides longevity as when a missile is sealed

within a canister it can be stored in silo for up to 10 years.[9] Canisterisation also enables smooth and safe launch of missile from anywhere at any time, thus easing transportation, storage, launching and handling. Also, they are filled with "inert gases to provide protection from outside environment during storage and transportation".[10] Generally, conventional canisters are made for specific missiles, and are thus limit operational flexibility. But new canister technologies facilitate "interchangeable assemblies" that include "longitudinal assemblies" of electronics module and hatch module for aggregating multiple missile types.[11]

Nearly all nuclear weapon states with mature technologies maintain their missiles in a state of canisterisation. USA and Russia have been doing so since cold war days. For instance, United States missile technology, amongst others, has used canisters such as Mk 22, Mk 13, Mk 15, Mk 14, Mk 21, Self Defense Mk 22, Mk 25 etc. and they form the backbone of MK 41 Vertical Launching System (VLS) of United States.[12] Also in 1999, the United States designed the canister "to provide the launch platform for the National Missile Defense (NMD) interceptors".[13] Recently, in 2020, a Standard Missile 3 (SM-3) Block IIA interceptor hosted by a physical canister, Mark 41 Vertical Launch System, successfully destroyed an intercontinental-range ballistic missile (ICBM) target in a milestone test thus becoming the second U.S. interceptor with this capacity.[14] Moreover, the crucial Phased Array Tracking to Intercept of Target (PATRIOT) Advanced Capability-Three (PAC-3) missile program of United States also heavily uses "canisters that serve as shipping container and launch tubes".[15]

Similarly, Russia since Cold War has used this technology, for instance, amongst others, Russia's RT-21 Temp-2S missile, which was developed in Cold War and is decommissioned now, was a three-stage solid-propellent missile, uses transport launch canister.[16] Furthermore Russia's R-36 M intercontinental ballistic missile was also deployed in modified silos and used a cold-launch technique and was kept in a "transport-launch canister made of fiberglass composites".[17]

China has also relied on canister missile launch system and to increase the readiness of its missiles. In October 1999, in its military parade, China displayed the DF-31 ICBM in its launch canister on a transporter-erector-launcher (TEL).[18] "China debuted its first solid-fuelled ICBMs in 2006 with the DF-31", it is "three-stage, road-mobile missile that is transported in a 15-meter canister on a six-axle transporter-erector-launcher (TEL)".[19] Admiral Philip Davidson stated that PLA rocket forces "maintain a high degree of combat readiness".[20] Also, according to US Defense Department PLA rocket forces conduct "combat readiness duty" and "high alert duty" drills which involves "assigning a missile battalion to be ready to launch and rotating to standby positions as much as monthly for unspecified periods of time".[21]

India's move in this direction is a demonstration of its technological progression. Prithvi-III, a naval version of Prithvi was tested by India in 2004 from a specially designed canister base.[22] Also, India's MRSAM, which is a land based medium range air defence surface-to-air missile system, enables "transportation, emplacement, erection, activation and launch of eight MRSAM canisterised missile from a vertical position in a single as well as ripple modes". Also, the Prahaar missile launcher is designed and configured to carry six pressurized Canister AAD Missile.[23] India's Shaurya missile is also a canisterised missile.[24]

While India plans to build a small stockpile of nuclear warheads, to increase the credibility of its deterrence, it is accelerating technical advances in Agni series of missiles.

While it is true that canisterised missiles alter the current disposition of keeping forces in a disassembled and de-mated state, but enhanced mobility through canisterised missiles also enhances survivability of the nuclear arsenal, thus bringing more confidence in the no first use doctrine. Indian nuclear doctrine is defensive in nature based on the concept of credible minimum deterrence. While India plans to build a small stockpile of nuclear warheads, to increase the credibility of its deterrence, it is accelerating technical advances in Agni series of missiles. These are part of the nuclear triad and also central to India's nuclear deterrence.

Notes

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