BrahMos Missile

***Prelims**: Current events of national and international importance| Security Issues*

Why in news?

Recently BrahMos missile was likely used in the precision strikes against Pakistan's military bases during Operation Sindoor on May 10.

- **BrahMos missile** – It is an ***unmanned*** payload rocket, which is equipped with a propulsion system, guidance system and a warhead.



- **Origin –** BrahMos is a joint venture between India's DRDO and Russia's NPO Mashinostroyenia (NPOM).
- It is named after the *Brahmaputra (India) and Moskva (Russia)* rivers.
- India holds 50.5% stake, Russia holds 49.5% stake and it is first successfully tested on June 12, 2001.

Technical Specifications

- It is a ***Supersonic cruise missile*** (3 times the speed of sound in cruise phase).
- It can take a trajectory from Low to high in a quick time period, and it is very difficult for any ship-based radar to detect.
- **Two-stage missile** - First stage is solid propellant booster engine which propels to supersonic speed, and it then gets separated.
- The second stage of the liquid ramjet then fires and thrusts the missile to three times the speed of sound in its cruise phase.

Liquid ramjet is an air-breathing jet engine that uses liquid fuel, which is injected into high-speed airstream and ignited to produce thrust.

- **Fire and forget** - 'Fire and forget' missiles are guided weapons that require no further input or control after being launched.
- It can achieve cruising altitude of 15 kilometers and terminal altitude as low as 10 meters
- BrahMos is its extremely *low radar cross-section (RCS)* because of its compact design and use of special materials.

Low Radar Cross Section (RCS) refers to a design that minimizes an object's reflection ability, so that it cannot be detected by the Radars.

BrahMos variants

- **Navy variant** – It can be fired from moving/static naval platforms.
- **Land variant** – It can be launched from mobile autonomous launchers with 3 missiles per launcher.
- **Air variant** – It is carried by Sukhoi-30 MKI fighter jets.
- **Submarine variant** – It can be launched from 50 meters below water surface.
- **BrahMos-NG (Next Generation)** – It is under development with reduced dimensions and enhanced stealth.
- Recently the *BrahMos Aerospace facility* was inaugurated in Lucknow to produce the BRAHMOS-NG variant.

Strategic Importance

- It is considered as a versatile "***stand-off range weapon***" because they can be launched from a safe distance, keeping the attacker out of enemy defence range.
- It is superior than subsonic cruise missiles (Nirbhay) with high speed, flight range, and more kinetic energy.

Reference

The Indian Express| BrahMos missile

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