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## Indian Navy tests land attack Brahmos supersonic cruise missile: All you need to know

The Brahmos missile is developed by a joint-venture between Russia's Mashinostroyenia and India's Defence Research and Development Organisation (DRDO).

The Indian Navy conducted its first test-firing of the sea-to-land attack version of its advanced supersonic cruise missile Brahmos on Friday. The missile has a strike range of at least 290 km and can hit targets with pin-point accuracy while cruising at supersonic speeds. The Navy conducted the test off the shore of Andaman and Nicobar Islands. The missile, installed on a naval warship INS Teg, was fired at a target on an island among a group of other targets. The missile destroyed the locked target with precision. This successful test puts India into the superior league of countries that have this kind of strike capability.

The Brahmos missile is developed by a joint-venture between Russia's Mashinostroyenia and India's Defence Research and Development Organisation (DRDO). The name Brahmos is a portmanteau of the Brahmaputra and the Moskva rivers.

The missile is a two-stage supersonic cruise missile. The first phase is run by a solid-propellant booster engine. This launches the missile and takes it to supersonic velocity. It then detaches. The second phase then kicks in with the liquid fuel ramjet engines that take the missile to cruise speeds of up to mach 3 — nearly three times the speed of sound.

The missile is equipped with advanced embedded software, guidance systems and stealth technology which increases its precision strike capability. The team that has developed the missile claims that no known weapons system can intercept the Brahmos. The missile operates on 'fire and forget principle'. It means that after the launch, the missile can make use of a lot of different flight trajectories as it approaches the target. The warhead that the Brahmos carries is anywhere around 200-300 kgs. While its cruising altitude can go up to 15 km, it can achieve a terminal altitude of 10 metres. Its massive kinetic energy adds to its destructive power.

The Brahmos missile uses a Transport Launch Canister. This is used to transport, store and launch the missile and the Brahmos has identical configuration for all variants apart from the airborne — land, sea, sub-sea.

When was the Brahmos missile inducted?

The Brahmos Weapons Complex was inducted for the first time by the Navy back in 2005. It is the first supersonic cruise missile in service. The missile system was first configured with the INS Rajput. All naval vessels which will be built in the future or will come in for mid-life upgradation are to be fitted with the Brahmos missile. At least 10 ships have already been equipped with the system.

The Indian Army has also inducted three regiments of the land-based variant and induction of a fourth is in the pipeline. The land and sea variants are already in service while the air and submarine versions are still under trials. The missile is capable of being deployed in vertical as well as inclined configurations.

The first test firing of the missile was done on 12 June 2001 from Integrated Test Range (ITR), Chandipur in a vertical launch configuration. The next test was done in June 2004 when it was fired from a mobile launcher. Four years later in March 2008, the missile was test fired from Indian Navy's destroyer INS Rajput. Another test was done from INS Ranvir in December 2008.

The Army variant's first successful test launch was conducted in December 2004 at a test range in Pokharan and then subsequently in 2007 as well.

In a trial in 2009, the missile was equipped with a new navigation system but during the test it missed the target. It was maintained the problem was in the software and not the hardware. After this glitch and

modifications, the Army was convinced of the high standards of the missile and the Block II version of the missile was completed.

In 2010, two major developments took place. In March, the missile struck a free floating ship in a test and in September achieved a world record—it tested at supersonic speeds in steep dive missions.

In what is another impressive quality, the Brahmos is the only supersonic cruise missile in the world that can lock in on a target amid a flurry of bogeys/targets and engaging the selected target.

The Block III was tested in December 2010. It could employ its steep dive capability to hit targets in mountainous terrains.

In October 2012, the missile was test fired from INS Teg frigate. This was the first time it was equipped with satellite navigation and it was also capable of carrying nuclear payloads.

The current navigation system of the missile forms a part of the Indian G3OM chip configuration which is GPS, GLONASS, GAGAN on a Module. The 17 gm system makes use of navigation system of Indian, Russian and US satellites and gives a strike accuracy of less than five 15 feet.

First submarine launch test was done in 2013 off the Bay of Bengal. In the future, the missiles would be configured in a way that it would be possible to launch the Brahmos from the torpedo tube itself.

The air launch trials are due this year with modifications done on Sukhoi 30 MKi which will be used to launch the missile for air-launched attacks.

The Brahmos is also a part of the government's Make in India and defence equipment export plans with the missile system being one of the most sought after defence product from India.



Sat, 22 Apr, 2017



### LAKSHYA UAV CRASHLANDS IN ODISHA

An Unmanned Aerial Vehicle (UAV) Lakshya of the Indian Air Force crashlanded in Odisha's Balasore district on Friday. The UAV crashlanded in a field at Chan-

damuhi village in Balia-pal block. DRDO sources said a technical glitch may have scuttled the flight of Lakshya and brought it down to the ground. IANS

“There may be some technical reason behind the accident. A DRDO team rushed to the spot. There was no loss of life and property”

Niti Shekhar, BALASORE SP

## S Korea storms into India's defence manufacturing

*Signs agreement with India to make ships and a pact with L&T to make self-propelled artillery guns*

Since the turn of the century, six arms suppliers have dominated India's defence imports --- USA, Russia, Israel, France and the UK. Now, a muscular new player, South Korea, is storming this lucrative club.

On Friday, in New Delhi, the governments of India and the Republic of Korea (or RoK, as South Korea is called) signed a memorandum of understanding (MoU) for joint shipbuilding, which clears the decks for cooperatively building five fleet support ships (FSS) for about Rs 10,000 crore.

These FSS will replenish ammunition, fuel, food and supplies to navy flotillas operating far from their bases. The RoK wants to build one FSS in Korea, and four in Hindustan Shipyard Ltd, Visakhapatnam (HSL), while New Delhi is pressing to build all five in HSL.

Separately, Indian company, Larsen & Toubro (L&T) earlier on Friday signed a contract with RoK firm, Hanwha Techwin, for jointly building in India 100 self-propelled artillery guns, worth Rs 5,000 crore.

Meanwhile, for an even bigger production order worth about Rs 30,000 crore, Goa Shipyard Ltd (GSL) is in advanced negotiations with South Korea's Kangnam Corporation for building 12 mine counter measure vessels (MCMVs) in Goa. In Delhi on Tuesday, the navy's warship acquisition chief, Vice Admiral DM Deshpande, said that deal too could be concluded this year.

"By the fourth quarter of this year, we should be in a position to have pen to paper so far as this [MCMV] project is concerned", said Deshpande.

That would involve South Korea in defence production contracts worth 45,000 crore. However, a significant part of that money would flow to Indian production agencies.

The K-9 Vajra-T gun that L&T and Hanwha Techwin will build together is a 155-millimetre, 52 calibre gun, mounted on a tracked, armoured vehicle. Artillery units equipped with this highly mobile gun will be a part of the army's strike corps, whose tank spearheads need artillery guns that can keep pace with them.

"L&T plans to begin production of this vital weapon system at its Strategic Systems Complex at Talegaon near Pune in Maharashtra and deliver the first batch of 10 guns [from Talegaon]. L&T also has initiated setting up of a greenfield manufacturing line at Hazira, Gujarat, integral with a state-of-the-art test track, to produce, test and qualify the K9 Vajra-T guns", stated Jayant Patil, chief of L&T's defence business.

L&T committed on Friday that it would not just build the Vajra in India, with over 50 per cent indigenous content, but also provide the army through-life support.

The defence ministry is especially pleased with the shipbuilding MoU, which is likely to galvanise Hindustan Shipyard Ltd (HSL) that would build the FSS in partnership with a reputed RoK shipyard, probably part of Hyundai Heavy Industries (HHI).

Officials expect that HSL, a government-owned shipyard that was transferred from the ministry of shipping to the defence ministry in February 2010, will now have the high value orders and expertise needed to put it on a firm financial footing.

A key component of the RoK-India MoU is the agreement for Seoul to nominate a South Korean shipyard to "upgrade and modernise [HSL's] facilities and execute naval shipbuilding projects in a timely and cost effective manner", according to a defence ministry release on Friday.

After years in the red, HSL's chief, Rear Admiral Sarath Babu (Retired), revealed this week that HSL would, for the first time, make an operating profit of Rs 30 crore, on a turnover of Rs 625 crore in 2016-17.

Interestingly, the FSS order will be the second cooperative project between HSL and a RoK shipyard. In the early 1990s, HSL and Korea Tacoma cooperated to build seven offshore patrol vessels (OPVs) of the Sukanya class.

Three of these OPVs were built in Korea and four in HSL, and all are still in service.

One of the Sukanya-class OPVs built in HSL, INS Sarayu, was sold to the Sri Lanka Navy, where it continues to perform the role of navy flagship, now named Sayura.

Defence cooperation with RoK is backed by a burgeoning political engagement between New Delhi and Seoul. In May 2015, when Prime Minister Narendra Modi met the (now impeached) RoK president, Park Geun-hye in Seoul, the two countries upgraded their relationship to a “Special Strategic Partnership”.

Modi also visited Hyundai Heavy Industries shipyard during that trip and expressed his hope that Korean expertise could benefit Indian shipyards soon.



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## भारत और दक्षिण कोरिया मिलकर बनाएंगे युद्धपोत

जनसत्ता ब्यूरो  
नई दिल्ली, 21 अप्रैल।

भारत और दक्षिण कोरिया ने रक्षा जहाज निर्माण में द्विपक्षीय सहयोग मजबूत करने के लिए शुक्रवार को एक समझौते पर हस्ताक्षर किए। सहमति पत्र (एमओयू) के तहत दोनों देश इस उद्देश्य के लिए अपने एक-एक शिपयार्ड को नामित करेंगे। सचिव (रक्षा उत्पाद) अशोक कुमार गुप्ता ने कहा कि भारत ने इस उद्देश्य के लिए हिंदुस्तान शिपयार्ड लिमिटेड (एचएसएल) को नामित किया है, जबकि कोरिया जल्द ही घोषणा करेगा।

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### ‘Nepal-China military exercise cut short due to Indian pressure’

Beijing: Nepal was forced to scale down its first military exercise with China because of purported pressure from India, Chinese state media reported on Friday.

“It was said the two countries initially planned to hold a battalion-scale military exercise. However, facing a strong opposition from India, Nepal had to compress the size of the military exercise and change the venue to a military school,” state-run Global Times tabloid reported.

The exercise, code-named Sagarmatha Friendship 2017, began on April 16.

“For Nepal, the joint military exercise has a deeper significance. For starters, it shows that Nepal moves forward in its pursuit of a balanced diplomacy among major powers,” said the piece in the newspaper that often publishes articles critical of India.



“Since the 1990s, balanced diplomacy has become the basic principle of Nepal’s foreign strategy, which is established based on Nepal’s nationalism and antiIndian sentiment,” it said.

“Holding joint military exercises with China can contribute to deterring ethnic separatism in Nepal,” the article added.

China, according to reports, has expressed its backing for Nepal’s new Constitution that was strongly opposed by Madhesi groups because of fears that it marginalised their political and constitutional rights.

“It is a normal development for China to hold a military exercise with Nepal as Nepal is China’s friendly neighbour.

There are many countries which have held joint military exercises, including India, with China. South Asia is a terrorism-prone region.

Now that China and Nepal have developed closer economic relations, Nepal hopes to join China’s Belt and Road initiative, for which regional security and stability is a necessity,” the article further said.

## THE ASIAN AGE

Sat, 22 Apr, 2017

### Introducing ‘Operator 4.0’ to help human employees

*By Thorsten Wuest, David Romero and Johan Stahre*

*Researchers say there does not have to be conflict between robots and humans, with machines taking people’s jobs*

The Fourth Industrial Revolution has arrived. The first was the steam engine-driven Industrial Revolution; the second involved the innovations from Henry Ford’s assembly line. Third, microelectronics and computer power appeared on factory floors.

Now, manufacturing businesses are beginning to integrate robotics, automation and other data-driven technologies into their workflows.

Robots have taken over difficult, dangerous and repetitive physical tasks, improving factory safety, worker comfort and product quality.

The next phase of labour innovation will do the same thing for cognitive work, removing mentally stressful and repetitive tasks from people’s daily routines.

Human work will become more versatile and creative. Robots and people will work more closely together than ever before. People will use their unique abilities to innovate, collaborate and adapt to new situations.

They will handle challenging tasks with knowledge-based reasoning. Machines enabled by the technologies that are now becoming commonplace — virtual assistants like Siri and Alexa, wearable sensors like FitBits and smart watches — will take care of tedious work details.

People will still be essential on the factory floors, even as robots become more common. Future operators will have technical support and be superstrong, super-informed, supersafe and constantly connected.

We call this new generation of tech-augmented human workers, both on factory floors and in offices, “Operator 4.0.” There are several types of enhancements available, which can be used individually or in combination to put humans at the heart of this technological revolution. One straightforward enhancement would let workers wear robotic exoskeletons to enhance their strength. A “super-strength operator” could let a human truly control the physical power of a large robot. In today’s warehouses and construction sites, workers risk injury and exhaustion by handling heavy objects themselves. Or they are forced to compromise, using a more powerful tool with less adaptability, like a forklift.

The benefits go well beyond the workplace. Of course, a worker in a powered robotic suit could easily handle extremely heavy objects without losing the flexibility of natural human movements.

The worker would also be far less likely to suffer severe injuries from accidents or overwork.

And at the end of a day, a super-strength worker could take off the exoskeleton and still have energy to play with the kids or spend time with friends.

Fighter pilots use heads-up displays, which provide them with crucial information right on the cockpit windshield and directly in their line of sight. This is “augmented reality,” because it displays information within a live view of the world. It used to be very specialized and expensive technology. Now, Microsoft’s HoloLens makes it available for consumers.

An “augmented operator” can get directions or assistance without interrupting the task he or she is working on. Often, when new equipment or processes are developed, trainers need to travel long distances to factories, staying for weeks to teach workers what to do. Possibilities are limitless. But there does not have to be conflict between robots and humans, with machines taking people’s jobs and leaving them unemployed. Technology should be designed with collaboration in mind.