

India successfully test-fires N-capable cruise missile

By Rajat Pandit

India on Tuesday successfully flight-tested its indigenous 'Nirbhay' (the fearless) land-attack cruise missile, which can deliver nuclear warheads to a strike range of 1,000km, after a string of failures since March 2013. The development is significant because the armed forces have for long been demanding nuclear land-

THE DESI TOMAHAWK

NIRBHAY MISSILE:

- > Indigenous cruise missile
- > 1,000-km strike range
- > Carries nuclear warhead
- > Can loiter & cruise at Mach 0.7 (sub-sonic) at altitudes as low as 100-metre
- > 1st test in Mar 2013 failed
- > 2nd test in Oct 2014 was a partial success
- > 3rd & 4th tests in Oct 2015 & Dec 2016 also flopped

CRUISE VS BALLISTIC:

- > Ballistic missiles follow parabolic path, leave & re-enter atmosphere to hit target
- > Ballistic missiles have longer ranges & predetermined targets
- > Cruise missiles fly at low-altitudes, hugging terrain to evade radars
- > Cruise missiles loiter before striking targets

INDIA'S BALLISTIC MISSILES:

- > Agni-I (700-km), Agni-II (2,000-km) & Agni-III (3,000-km) inducted
- > 2 years to induct Agni-IV (4,000-km) & Agni-V (5,000-km)
- > Prithvi-II & Dhanush (150-350-km) inducted
- > Submarine-launched ballistic missiles K-15 (750-km) & K-4 (over 3,000-km) being tested

BRAHMOS MISSILE:

- > Cruise missile jointly produced by India & Russia
- > Only 290-km range inducted. Extended range missile (450-km) undergoing trials
- > Carries conventional (not nuclear) warhead
- > Supersonic, flies at Mach 2.8

attack cruise missiles (LACMs), with ranges of over 1,000km and versatile enough to be fired from land, air and sea.

Often brandished as India's answer to the famed American Tomahawk missiles, as also an effective counter to Pakistan's Babur LACM, Nirbhay has been in the making for a decade.

The sub-sonic missile is designed to carry a 300kg nuclear warhead. Tuesday's test, the missile's fifth (see graphic), at 11.20am from the Integrated Test Range at Chandipur off Odisha, was dubbed a "complete success by DRDO." "The flight test achieved all mission objectives completely from lift-off till the final splash. The missile majestically cruised for 50 minutes, achieving the range of 647km," said an official.

Defence minister Nirmala Sitharaman expressed "optimism" the successful trial would take India into "the select league of nations that possess this complex technology of sub-sonic cruise missile capability". A series of successful tests of this groundlaunched version of Nirbhay will pave the way for its induction into the armed forces, though its sea-based variant, capable of being fired from nuclear-powered submarines, will be the real game-changer.

Cruise missiles like the Nirbhay are designed to fly at low altitudes to evade enemy radars and missile defence systems. After an initial blast-off with a solid-propellant booster rocket engine to gain speed and altitude, Nirbhay deploys its smallish wings and tail fins in the second stage to fly like an unmanned aircraft. It's designed to be highly maneuverable with "loitering capabilities" to identify and then hit the intended target.

Nirbhay test-fire successful at last

INDO-ASIAN NEWS SERVICE
CHANDIPUR, 7 NOVEMBER

India on Tuesday successfully test-fired its indigenous subsonic cruise missile *Nirbhay*, which failed its last test in December 2015, an official statement said.

In a major achievement, the first indigenously-designed and developed Long Range Sub-Sonic Cruise Missile which can be deployed from multiple platforms, was successfully test fired from the Integrated Test Range here in Odisha.

The test took place after the error, that led to the failure of its fourth trial in December last year, were rectified, said the statement. The missile has the capability to loiter and cruise at 0.7 Mach, at altitudes as low as 100 metres. The flight test achieved all the mission objec-



tives completely from lift-off till the final splash, boosting the confidence of all scientists associated with the trial, it added. The missile took-off in the programmed manner and all critical operations including launch phase, booster deployment, engine start, wing deployment and other operational parameters demonstrated through autonomous waypoint navigation. The guidance, control and navigation sys-

tem of the missile is configured around the indigenously designed Ring Laser Gyroscope and MEMS based Inertial Navigation System along with GPS system.

"The missile majestically cruised for a total time duration of 50 minutes, achieving the range of 647 km. The missile was tracked with the help of ground based radars and other parameters were monitored by indigenous

telemetry stations developed by DRDO," the statement said.

Defence minister Nir-mala Sitharaman hailed the success of DRDO scientists and complimented them for this inspired achievement.

She was optimistic that this successful trial would take India to the select league of nations for possessing this complex technology and sub-sonic cruise missile capability. DRDO Chairman S Christopher, DG, Aero, C P Ramanarayanan, along with other senior DRDO scientists and user representatives from Army witnessed the momentous launch and congratulated the team *Nirbhay* for making DRDO proud for the long awaited achievement.

THE HINDU

Indigenously developed long range subsonic cruise missile 'Nirbhay' test flown for 5th time

All initial critical operations of the trial, such as the blast off, were successful as it moved up in its trajectory, a DRDO scientist said.

Indigenously designed and developed long range subsonic cruise missile 'Nirbhay', which can carry warheads weighing up to 300 kg, was tested from a range at Chandipur along the Odisha coast on Tuesday.

This was the fifth experimental test of the missile system. Of of four earlier trials, since its maiden launch on March 12 in 2013, only one was successful.

The state-of-the-art sleek cruise missile took off from a specially designed launcher from the launch complex-3 of the Integrated Test Range (ITR) near Balasore at 11.20 a.m., sources in the Defence Research and Development Organisation (DRDO) sources said.

All initial critical operations of the trial, such as the blast off, were successful as it moved up in its trajectory, a DRDO scientist said. Data was being retrieved from the tracking systems for a detailed assessment, he added.

Powered by a solid rocket motor booster developed by the Advanced Systems Laboratory (ASL), the missile has an operational range of 1,000 km.

The missile can travel with a turbofan or turbojet engine and is guided by a highly advanced inertial navigation system indigenously developed by the Research Centre Imarat (RCI), the DRDO sources said.

After the missile achieves designated altitude and velocity, the booster motor is separated and the engine automatically switches on taking further propulsion, said a DRDO scientist associated with the project.

He said “mid-way in its flight, the missile’s wing opens up by the commands generated by the onboard computer for stabilising the flight path.”

All along its trajectories, from lift off to splash down, the missile is to be tracked with the help of ground based radars and IAF aircraft.

The health parameters of the vehicle are being monitored by indigenous telemetry stations by a team of professionals from the DRDO’s ITR and LRDE (Electronics and Radar Development Establishment).

The two-stage missile is 6 metre long, 0.52 metre wide with a wing span of 2.7 metre. It can fly at a speed of 0.6 to 0.7 Mach. Its launch weight is about 1,500 kg, the sources said.

The maiden test flight of ‘Nirbhay’ had to be terminated midway for safety reasons due to the malfunctioning of a component. However, the second launch on October 17, 2014 was successful.

In the next trial, conducted on October 16, 2015, the missile deviated from its path after covering 128 km.

The last test flight held on December 21, 2016 had to be aborted after 700 seconds of its test flight as it deviated from its designated path. All these trials were conducted from the same range at Chandipur.

THE ASIAN AGE

Wed, 08 Nov, 2017

India test fires subsonic cruise missile ‘Nirbhay’

By Akshaya Kumar Sahoo

Sources said the entire mission, from lift-off till the final splash down, was a perfect flight achieving all the mission objectives.

India on Tuesday test-fired its most sophisticated long-range sub-sonic cruise missile “Nirbhay” from the integrated test range (ITR) at Chandipur in Odisha’s Balasore district. According to DRDO sources, the indigenously-designed and developed missile with a strike range of 1,000 km was test-launched from a specially-designed launcher at 10.30 am from the Launch Complex-3 of the ITR. Sources said the entire mission, from lift-off till the final splash down, was a perfect flight achieving all the mission objectives. Propelled by a solid rocket motor booster, Nirbhay, with a turbo fan engine, is guided by a highly advanced inertial navigation system.

The maiden test flight of Nirbhay held on March 12, 2013, had to be terminated mid-way for safety reasons due to malfunction of a component, sources said.

However, the second launch on October 17, 2014 was successful. The next trial conducted on October 16, 2015, had to be aborted after 700 seconds of its launch. The missile was also test-fired last time in December 2017. There were reports that the test had failed even though there was no official confirmation on the reports. All these trials were conducted from the same defence base. Capable of carrying 24 kinds of war weapons, the missile is able to target multiple places simultaneously. After the missile achieves designated altitude and velocity, the booster motor is separated and the engine automatically switches on taking over further propulsion, sources added. Mid-way in its flight, missiles’ wing opens up by the commands generated by the sophisticated on board computer for stabilising the flight path.

Wed, 08 Nov, 2017

DRDO Launches Indigenous Nirbhay Missile

The indigenously designed and manufactured Nirbhay — a long range sub-sonic cruise missile — was successfully test fired by the Defence Research and Development Organisation (DRDO) on Tuesday at the Integrated Test Range (ITR) at Chandipur, Odisha.

The missile has the capability to loiter and cruise at 0.7 Mach, at altitudes as low as 100 metres and the flight test achieved all the mission objectives completely from lift-off till the final splash, officials said here adding it boosted the confidence of all scientists associated with the trial. The test was significant as four trials had failed or were aborted after technical defects. The missile fired by the ITR range on Tuesday cruised for a total time duration of 50 minutes, achieving the range of 647 km, the DRDO statement said adding the missile took-off in the programmed manner and all critical operations viz launch phase, booster deployment, engine start, wing deployment and other operational parameters were demonstrated through autonomous way point navigation.

The guidance, control and navigation system of the missile is configured around the indigenously designed Ring Laser Gyroscope (RLG) and MEMS based Inertial Navigation System (INS) along with GPS system, the statement added. The missile was tracked with the help of ground based radars and other parameters were monitored by indigenous telemetry stations developed by DRDO.

Defence Minister Nirmala Sitharaman hailed the success of the DRDO scientists and said she was optimistic that this successful trial will take India to the select league of nations possessing this complex technology and sub-sonic cruise missile capability. Chairman DRDO Dr S Christopher along with other senior scientists and user representatives from Army witnessed the launch and congratulated the team.

Business Standard

Wed, 08 Nov, 2017

DRDO Conducts Successful Flight Trial of 'NIRBHAY' Sub-Sonic Cruise Missile

Defence Research and Development Organisation (DRDO) achieved yet another feat today with the successful test flight of NIRBHAY - Indias first indigenously designed and developed Long Range Sub-Sonic Cruise Missile which can be deployed from multiple platforms. It was successfully test fired from the Integrated Test Range (ITR), Chandipur, Odisha. The missile has the capability to loiter and cruise at 0.7 Mach, at altitudes as low as 100 m. The flight test achieved all the mission objectives completely from lift-off till the final splash, boosting the confidence of all scientists associated with the trial.

The missile took-off in the programmed manner and all critical operations viz. launch phase, booster deployment, engine start, wing deployment and other operational parameters demonstrated through autonomous way point navigation. The guidance, control and navigation system of the missile is configured around the indigenously designed Ring Laser Gyroscope (RLG) and MEMS based Inertial Navigation System (INS) along with GPS system. The missile majestically cruised for a total time duration of 50 minutes, achieving the range of 647 km. The missile was tracked with the help of ground based radars and other parameters were monitored by indigenous telemetry stations developed by DRDO.

Raksha Mantri Smt Nirmala Sitharaman, hailed the success of DRDO Scientists and complimented them for this inspired achievement. She was optimistic that this successful trial would take India to the select League of Nations for possessing this complex technology and sub-sonic cruise missile capability.

Chairman DRDO and Secretary Department of Defence (R&D), Dr. S Christopher, DG (Aero) Dr. CP Ramanarayanan, Director ADE, RCI, ITR and CEMILAC, along with other senior DRDO scientists and user representatives from Army witnessed the momentous launch and congratulated the team NIRBHAY for making DRDO proud for the long awaited achievement.

पंजाब केसरी

Wed, 08 Nov, 2017

स्वदेशी सबसॉनिक क्रूज मिसाइल 'निर्भय' का परीक्षण



बालासोर, (वाती): भारत ने स्वनिर्मित सबसॉनिक क्रूज मिसाइल 'निर्भय' का आज चांदीपुर स्थित इंटीग्रेटेड टेस्ट रेंज (आईटीआर) से परीक्षण किया। आईटीआर के सूत्रों ने बताया कि निर्भय मिसाइल अमेरिकी टॉमहॉक और पाकिस्तान के बाबर मिसाइल का जवाब है। निर्भय मिसाइल का यह पांचवां परीक्षण है। इससे पूर्वाहन 11 बजकर 20 मिनट पर छोड़ गया। इसकी मारक क्षमता एक सौ किमी है।

स्वदेशी क्रूज मिसाइल निर्भय का सफल परीक्षण

भारत की प्रथम स्वदेश निर्मित परमाणु आयुध ले जाने में सक्षम सब सोनिक क्रूज मिसाइल निर्भय का मंगलवार को चांदीपुर के परीक्षण रेंज (आईटीआर) से सफल परीक्षण किया गया। इसकी मारक क्षमता एक हजार किमी से अधिक है। मिसाइल को सुबह 11:20 बजे एकीकृत परीक्षण रेंज के लांच पैड नंबर तीन से एक मोबाइल लांचर के जरिए दागा गया। 700 से 1 हजार किमी तक की लंबी दूरी तक मार करने की क्षमता वाली सब सोनिक क्रूज मिसाइल निर्भय का परीक्षण संपूर्ण सफल रहा।

भारत के पास 300 किमी दूरी तक मार कर सकने वाली सुपर सोनिक ब्रह्मोस क्रूज मिसाइल है। इसे भारत और रूस ने संयुक्त रूप से विकसित किया है। लेकिन लंबी दूरी की मारक क्षमता वाली निर्भय मिसाइल को रक्षा अनुसंधान व विकास संगठन (डीआरडीओ) द्वारा विकसित की गई एक अलग किस्म की मिसाइल है। निर्भय मिसाइल में धीमी गति से आगे बढ़ने, बेहतरीन नियंत्रण एवं दिशा निर्देशन, सटीक परिणाम देने और रडार से बच निकलने की क्षमता है। निर्भय का पहला परीक्षण 12 मार्च 2013 को किया गया था। मंगलवार को हुए इस परीक्षण के मौके पर डीआरडीओ एवं अंतरिम परीक्षण परिषद (आईटीआर) से जुड़े वरिष्ठ अधिकारियों एवं वैज्ञानिकों का दल उपस्थित था।

उल्लेखनीय है कि विगत एक सप्ताह से चांदीपुर के परीक्षण स्थल से विभिन्न प्रकार के मिसाइल एवं बम का परीक्षण सफलता पूर्वक किया जा रहा है। सूत्रों की माने तो आने वाले दिनों में और इसी तरह से और कई परीक्षण किए जाने की संभावना है।

नवभारत टाइम्स

24 तरह के हथियार ले जानी वाली मिसाइल 'निर्भय' का टेस्ट सफल

भारत ने मंगलवार को स्वदेशी सबसोनिक क्रूज मिसाइल 'निर्भय' का ओडिशा के चांदीपुर में सफल परीक्षण किया है। यह मिसाइल एक साथ 24 तरह के युद्ध हथियार ले जाने में सक्षम है। साथ ही इन हथियारों से एक साथ कई स्थानों पर निशाना लगाया जा सकता है। पिछले पांच वर्षों में मिसाइल का यह पांचवां परीक्षण था। हालांकि पिछले चार में से तीन परीक्षण विफल रहे थे।

300 किलो हथियार ले जाने में सक्षम

1000 किमी. तक मार कर सकती है निर्भय

6 मीटर लंबी है मिसाइल (0.52 मीटर चौड़ी)



India Tests Futuristic Gun Capable of Firing at Mach 6

New Delhi: India has taken a giant leap in developing futuristic weapon platforms with the Defence Research and Development Organization (DRDO) successfully developing electromagnetic railguns (EMRG). The EMRG can fire projectiles at extremely high velocities reaching up to Mach 6 or 4,600 miles per hour. These railguns launch the projectile without using explosives or propellants. Instead they use kinetic and laser energy to achieve extremely high velocities.

DRDO officials claimed that they tested a 12 mm square bore EMRG and in the next stage they will go for the 30 mm variety, according to *Sputnik News*. The railguns being developed will be able to launch a one kilogram projectile with a velocity of more than 2,000 m/s with a capacitor bank of 10 megajoules.

According to defence experts these railguns are easy to handle and can be deployed very quickly in any theatre of operation. Using such advanced and devastating weapons also boosts the morale of troops and act as force multiplier, added another expert.

However, they added that India is still perfecting the technology used in electromagnetic railguns and the armed forces are a few years away from getting these weapons. Such platforms are extremely useful for naval forces due to their ability to respond immediately with long-range, accurate and high-volume fire support.

These weapons will hit the target with extreme speed and accuracy without giving the enemy any chance to escape. In a conventional gun, the projectiles are launched based on gas expansion which follows the usage of explosives and chemicals. A conventional gun has limitation related to the launch velocity and range which can be limited to 1.5 km/s and 80 kilometres respectively.

The United States Navy is also testing railguns for attacking land-based targets and aerial threats including supersonic missiles.

PRESS TRUST OF INDIA
India's Premier News Agency

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(Online)

Weapon Museum at Chandipur in Odisha

Balasore (Odisha): A weapon museum, described as the first of its kind in the country, has come up in the premises of DRDO's Proof and Experimental Establishment at Chandipur and boasts of the Vijayanta Tank, which played a major role in the 1971 India-Pakistan war.

Defence Research and Development Organisation (DRDO) Chairman and Secretary Department of Defence Dr S Christopher, who was at Chandipur to witness the test fire of India's first indigenously designed and developed Long Range Sub-Sonic Cruise Missile 'Nirbhay', inaugurated the museum yesterday.

"Initially 14 types of weapons used by the Indian Air Force and Navy have been displayed for public view in the museum. More varieties of weapons will be displayed in future," PXE Director R Appavuraj said today. He described the museum as the first of its kind in the country.

The main attraction of the museum is Vijayanta Tank, which had played a major role in the 1971 India-Pakistan war. The tank has capacity to neutralise enemy bunkers and troops up to 5 km.

The other defence equipment of the artillery and naval force which are on display in the museum include WM-18 rocket launcher, 105 mm Indian field Gun, 122 mm grad BM-21 rocket launcher, 57 mm anti-tank

gun and 40 mm light gun. "Such a museum was required to impart knowledge and instill a sense of pride among youths and to make the public aware of the weaponry used to protect the sovereignty and territorial integrity of the country," he said.

This museum will be appreciated by tourists as well as students visiting Chandipur sea beach, he said

A proposal for setting up the museum had been sent to the Centre sometime back and now it has become a reality after obtaining sanction from the Ministry of Defence.

PXE is a DRDO establishment where different types of artillery, shells, field guns, tanks and rockets used by the armed forces are put to test.

The unit is meant for test, evaluation and proof of various types of armaments. India's 'Pinaka' multi barrel rocket launching (MBRL) systems are also tested here.

Located near the Integrated Test Range (ITR), where test launch of all varieties of missiles are conducted, the PXE was brought under the administrative control of DRDO in October, 1958.



*Wed, 08 Nov, 2017
(Online)*

India's first weapon museum comes up in Odisha

Balasure: With an aim to provide brief knowledge about defence and drag attention towards sacrifices made by Indian soldiers for the country during wars, India's first military weapon museum showcasing varieties of ammunition used in wars was set up at Chandipur here.

The museum was inaugurated by Defence Research and Development Organisation (DRDO) Chairman S Christopher at Proof and Experimental Establishment (PXE) complex on DRDO premises on Tuesday.

The museum will remain open for the public every day except the test-firing days. Later, the PXE authorities will decide the days for the visitors.

Total 14 weapons used in Indian Air Force and Indian Navy have been kept in the museum for the visitors.

Among arms and ammunition, Baijayant Tank, takes the centre of attraction at the weapon park. The tank was used in India-Pakistan war held in 1971. The tank, which was made in England, weighs 40,000 kg and has the capacity to reach the target upto 5 km.

The weapon park also features a number of ammunition and rocket launchers including WM-18 (rocket launch), 105 mm Indian field gun, 122 mm grad BM-21 (rocket launch), 57 mm anti tank gun, 40 mm light gun. These weapons and ammunition were used during several wars in Indian Army and Indian Navy. The weapon park was set up for the purpose of paying respect to jawans and to tell the new generations about our country's defence, said PXE Director R Appavuraj.

Earlier, PXE had proposed the Centre for establishing a weapon park at DRDO campus to allow the students to visit Chandipur and view the weapons used in wars.

Finally, the project came up following approval by Union Defence Ministry. The weapon museum is expected to turn out to be an attractive venue for the public and students in the country.