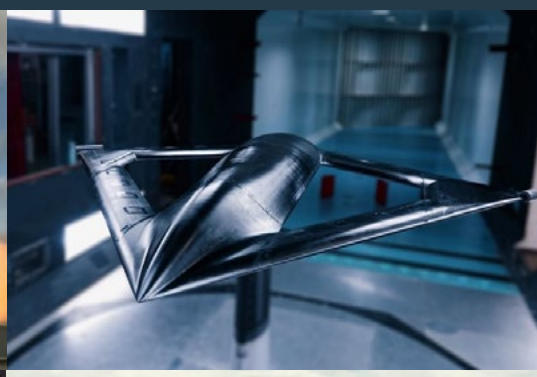
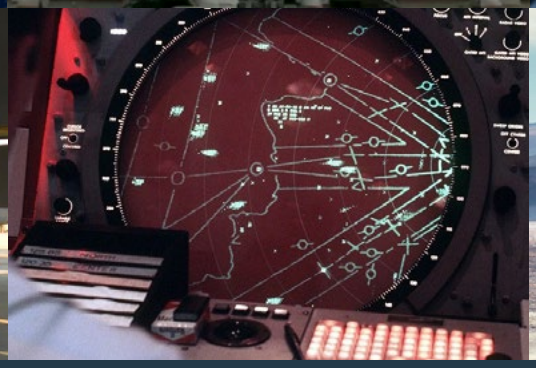
Defense Review 2021





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Overview

The evolving geopolitical situation has intensified the need for procurement and development of advanced weapons technology and led many countries to enhance and upgrade their arsenals. The year 2021 witnessed significant progress on this front with many countries unveiling their weapons upgrade plans and aircraft, warships, and missile procurement programs. These ameliorations are not only confined to the conventional domains such as naval technology, air defense systems, and land-based weapons but also explore new and unconventional domains such as space weapons and hypersonic missile technologies.

This edition of IRIA Defense Review focuses on the latest advancements in all domains of weapons technologies. In this edition, several ongoing and future military programs from around the world have been analyzed concisely to provide readers with relevant information on weapon development projects.

The United States' progress in the X-Plane project, LongShot UAV program, and Hypersonic weapons technology demonstrates that the U.S. military has paced its efforts to develop and procure the latest aerial defense technologies. While Russia is focusing on enhancing its naval capabilities with the development of its latest 23900 Amphibious Assault Ships Project. Russia is also increasingly focused on hypersonic weapons programs and has conducted several tests of submarine-launched and ship-launched hypersonic missiles.

China, after making significant progress on the naval front in the past few years, has shifted its focus on the advancement of its aerial warfare capabilities. China's new 20-series fighter jets and drones are set to become its most important air defense and assault assets. At present, China is also leading the hypersonic arms race with the capabilities of deploying operational missiles and advancing its ongoing missile development programs.

At the same time, Turkey is determined to become one of the biggest producers and exporters of drone and UAV technology. In South Asia, India and Pakistan are making significant progress in upgrading their arsenals through indigenously developed weapons as well as acquiring new technologies from their respective allies, the U.S. and China. In East Asia, Japan has acquired the latest AEGIS destroyer and is set to increase its naval capabilities amid the rising tensions in the Indo-Pacific region. While Iran's Alborz and Borhan air defense systems and North Korea's Hwagsong-8 hypersonic missiles have been the most significant advancements by the countries despite heavy sanctions.

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DARPA's X-Plane Program

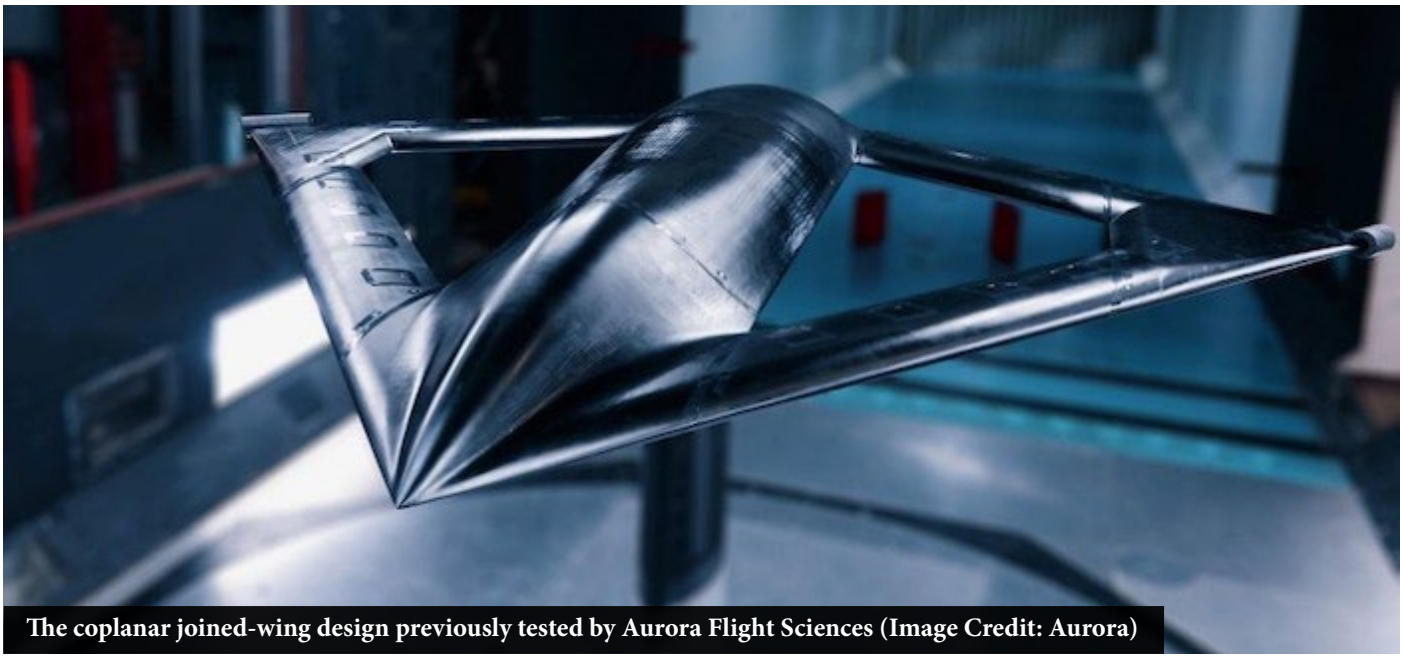
DARPA's X-Plane Program Enters into Phase 1 to develop Active Flow Control

The Airplane controlling methods have highly relied upon mechanical parts such as hinges, rudders, and shutters. Making adjustments to the parts under massive air pressure does not only have bad effects on the life of such parts but also increases the risk of malfunctioning. Traditional control mechanisms also affect an aircraft's maneuverability that is easily predictable and can be captured by radars.

Active Flow Control (AFC) is a technology that aims to design a seamless aircraft body. AFC does not only increases the efficiency of an aircraft but also provides better stealth capabilities. It could also have lower weight, size, complexity, and cost, compared with planes that use traditional controlling methods. This technology can be a pivotal point in achieving long dreamed, practical and efficient Vertical Take-off and Landing (VTOL) Aircraft.

Helicopters have been providing the ability for vertical take-off and landing as well as hovering capabilities in a practical situation. However, the helicopters have limited flight controlling ability, as well as less range, speed, and maneuverability. DARPA's Vertical Take-off and Landing Plane Experiment Plane Program or VTOL X-Plane program aims to integrate the vertical landing and take-off ability into conventional airplane designs.

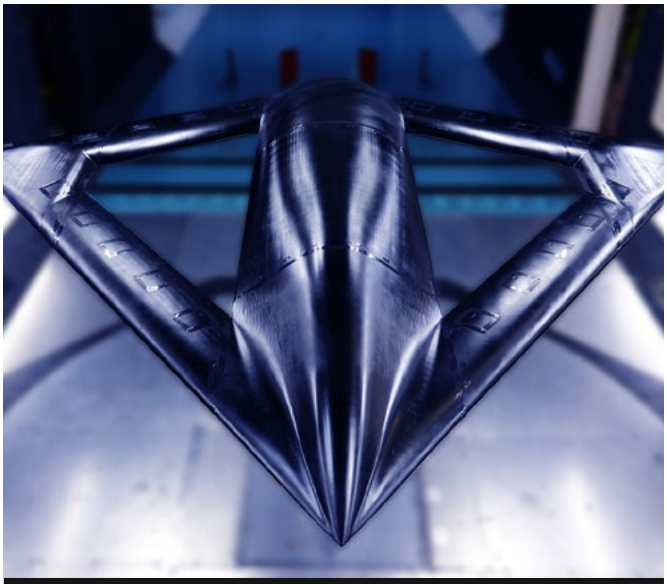
A faster VTOL aircraft can revolutionize mission performance by improving the mission time and increasing the potential of successful operation. Integrating VTOL abilities into conventional plane design has been a very challenging task for a long time, as any increase in the speed of such aircraft, compromises range, efficiency, and payload capabilities.



The coplanar joined-wing design previously tested by Aurora Flight Sciences (Image Credit: Aurora)

VTOL Experiment Plane Program (X-Plane) aims to achieve the following goals:

- Improving speeds up to 300kt – 400kt
- Increasing the hovering efficiency by 60 – 70 %
- Increasing cruise efficiency through aerodynamic design
- Improving load capacity by 40% to maintain optimum performance with 1000-12000 pounds gross weight.



X-Plane Model (Image Credit: Aurora)

DARPA has started Phase 1 of the X-Plane project focusing on better designing techniques under the CRANE Program. CRANE Program refers to Control of Revolutionary Aircraft with Novel Effectors, focusing on designing and the AFC that would help develop new control techniques for non-conventional plane designs.

DARPA has developed contracts with Aurora Flight Sciences, Lockheed Martin, and Georgia Tech Research Cooperation for further assistance in the execution of AFC in the X-Plane program. Aurora Flight Sciences is a Boeing Company that has expertise in designing contemporary aircraft integrated with autonomous control systems. Lockheed Martin is expected to provide assistance in making the design more compatible with defense maneuvering and also making it more inclusive for military purposes. Georgia Tech Research Cooperation has been added to the mix to provide assistance with software and design engineering of the systems for the new X-Plane program.

The program manager of CRANE, Dr. Alexander Walan defined the AFC as the new way forward for research and development in aviation technology.

> ***"The CRANE program is in a unique position to provide a comprehensive AFC database and the associated tools to future aircraft designers. The continuation of Georgia Tech Research Corporation's work in this area will ensure this valuable capability is successfully transitioned to the aircraft design community. All of the CRANE performers are exploring unique configurations and performance objectives; this additional performer adds to the diverse concepts and technologies being matured by the CRANE program"*** - Alexander Walan.

Phase 0 of the X-Plane program focused on developing the database, exploring the conceptual base, and analyzing the possible risks before moving forward into Phase 1. Now with the initiation of Phase 1, the program's conceptual base is expected to be matured and materialized under the CRANE program.

U.S. LongShot UAV Program

U.S. LongShot UAV Program moves to Next Phase

Partnering the manned and unmanned aircraft together is the next step forward in air combat superiority. DARPA's LongShot program aims to develop an air-launched Unmanned Air Vehicle (UAV) that has the ability to autonomously employ multiple air-to-air missiles. LongShot project has already passed its preliminary Phase I stage and now moved into the conceptualization art process. The LongShot would act like a "Loyal Wingman" drone to a combat aircraft providing a better stealth shield. The objective is to develop a novel UAV that can significantly extend engagement ranges, increase mission effectiveness, and reduce the risk to manned aircraft.

The LongShot program would allow high-value manned aircraft like fighter jets and bombers to stay back at distances, while the drones equipped with air-launched missiles could move forward and carry multiple strikes on targets.

The main concept behind LongShot is to put additional distance between the launching aircraft and the airborne threat or threats it is targeting. The program enables the launching platform to engage targets at greater distances and remain further away from the counterattack range.

The LongShot concept art released by DARPA

In February 2021, DARPA announced that they have awarded contracts to three companies for the further development of the LongShot project. The companies that have been awarded the contracts for the LongShot project are Northrop Grumman, General Atomics, and Lockheed Martin. Northrop Grumman has already released its first concept art for the LongShot Air Vehicle from its Virginia Headquarters.

While talking about Northrop Grumman's collaboration with DARPA Program Director for Kinetic Weapons and Emerging Capabilities at Northrop Grumman Jaime Engdahl stated that the LongShot Program has enabled Northrop Grumman and DARPA to combine our engineering expertise and our extensive knowledge in advanced weapon technology and autonomous system building to create something that shall have an exceptional range and effectiveness. This collaboration is a critical step towards enhancing our war-fighting and self-defense capabilities.

An artist's conception of Northrop Grumman's LongShot drone

Northrop Grumman's LongShot concept design has stealthy features, including a chinned fuselage. It is shown in the concept that the UAV has the capability to carry a pair of external missiles, which would increase its overall radar cross section. It's not explicitly stated in the concept art but the design is also intended to adjust internal weapon-carrying capabilities and the renderings show evident weapons bay doors.

The LongShot has the capacity to carry smaller weapons, while air-to-air missiles internally in its stealthy configuration would also increase its effectiveness. The system would have more flexibility in carrying outsized missiles that is a feature really useful for longer range and larger warheads.

DARPA program manager Air Force Lieutenant Colonel Paul Calhoun stated that "the LongShot program changes the paradigm of air combat operations by demonstrating an unmanned, air-launched vehicle capable of employing current and advanced air-to-air weapons".

> ***"LongShot will disrupt traditional incremental weapon improvements by providing an alternative means of generating combat capability"***- Lieutenant Colonel Paul Calhoun.

The entry for LongShot in the Department of Defense Fiscal Year 2021 budget proposal stated that "An air system using multi-modal propulsion could capitalize upon a slower speed, higher fuel-efficient air vehicle for ingress while retaining highly energetic air-to-air missiles for endgame target engagements." The proposal added that "First, the weapon system will have a much-increased range over their legacy counterparts for transit to an engagement zone. Second, launching air-to-air missiles closer to the adversary increases energy in terminal flight, reduces reaction time, and increases the probability of kill."

U.S. Hypersonic Weapons Development

The research and development plans for the hypersonic weapons system have been key priorities of the U.S. defense strategy since the early 2000s under the Conventional Prompt Global Strike program, and the U.S. Navy's CPS program has been focusing on the development of hypersonic weapons technology since 2003. However, it is only in recent years that the U.S. has paced its efforts and shifted focus on the development of hypersonic weapons upon seeing the advancements from Russia and China.

The U.S. Permanent Representative on Disarmament Robert Wood stated that the United States is "very concerned about China's hypersonic missile tests". Ambassador Wood added:

> ***"Hypersonic technology is something that we have been concerned about, the potential military applications of it and we have held back from pursuing, we had held back from pursuing military applications for this technology… But we have seen China and Russia pursuing very actively the use, the militarization of this technology so we are just having to respond in kind… We just don't know how we can defend against that technology, neither does China, neither does Russia."***

U.S. Secretary of Defense for Research and Engineering Michael Griffin described hypersonic weapon technology as "the foremost technical priority for the U.S. defense" while underscoring its importance. The U.S. officials' concerns over its adversaries' advancement in hypersonic technology suggest that Washington's hypersonic weapon programs are directly motivated by its rivals China and Russia, who are currently leading in the field.

Artist's conception of Lockheed Martin's hypersonic ARRW that can travel 500 miles in 10 minutes once fired from a B-52 bomber. (Image Credit: Mike Tsukamoto/Lockheed Martin/USAF)

In 2019 National Defense Authorization Act (NDAA) for FY2019-20 approved the required financial assistance for research and development of hypersonic weapons system. Since then, the U.S. Department of Defense has authorized several initiatives to develop and test the hypersonic capability.

There are two types of Hypersonic weapons that are under development: 1) Hypersonic Glide Vehicles that can be launched from a rocket before attaining hypersonic speeds to find and hit its target, and 2) Hypersonic Cruise Missiles that are powered by a high-speed engine and can be launched from surface or air.

The United States is pacing its efforts to add hypersonic missiles to its arsenal and dedicated at least 3% of its defense budget to research and development of hypersonic weapons. As per the information released by the Congressional Research Service, the United States currently has at least seven different hypersonic weapons development projects spread across Air Force, Army, Navy, and the Defense Advanced Research Projects Agency (DARPA).

Three of the seven hypersonic weapons research and development projects are being headed by DARPA, two programs are being pursued by the U.S. Air Forces while the U.S. Army and Navy are running one development program each.

The U.S. Air Force testing a prototype of X-51A Waverider hypersonic missile capable of flying at Mach 5.1 (Image Credit: Mike Cassidy/U.S. Air Force)

The U.S. has been lagging in the race of hypersonic missiles technology, as both China and Russia possess at least one operational hypersonic missile system capable of carrying nuclear and conventional warheads. After China and Russia's substantial advantage in the hypersonic weapons development, the U.S. defense strategists have noted that it is essential for the United States to develop similar technology in order to balance the asymmetry of distribution in this field.

At present, U.S. defense firms Lockheed Martin and Raytheon Technologies are working to develop hypersonic weapon capability. In August 2020, Lockheed Martin and the U.S. Air Force jointly conducted the flight test of AGM-183A Air-Launched Rapid Response Weapon on the B-52 bomber at the Air Force Base in California.

In May 2021, Lockheed Martin and Northrop Grumman in collaboration with the U.S. Navy's Conventional Prompt Strike and the U.S. Army's Long Range Hypersonic Weapon programs successfully conducted the initial live-fire hypersonic strike system test. During the first-stage solid rocket motor test, "the motor fired for the full trial duration and met performance parameters and objectives within anticipated ranges." Lockheed Martin's program director of conventional strike programs described the test as "a major milestone on the path to providing hypersonic strike capability to the U.S. Navy and U.S. Army warfighters."

In September 2021, Air Force Secretary Frank Kendall told reporters at the Air Force Association's Air, Space, and Cyber conference that the U.S. Air Force has also paced its work on hypersonic weapons but it is not moving fast enough, as compared to the U.S. adversaries.

The latest of the U.S. Navy's Conventional Prompt Strike hypersonic missiles test was carried out at NASA's testing facility in Wallops, Virginia on October 22, 2021. According to the sources at the pentagon, "the test demonstrated advanced hypersonic technology, capabilities and prototype system in realistic operation environment." However, further details about the make and operations of the missile have not been made public.

Based on the Department of Defense estimates, the U.S. Air Force expects to field an air-launched version of hypersonic missile in 2022, while the U.S. Army would have an operational ground-launched LRHW by the end of 2023. The Navy hopes to field its ship-launched hypersonic weapons in 2023 and a submarine-launched missile in 2024.

However, According to Congressional Research Services, despite being recognized as a top priority it is quite unlikely for the U.S. to be able to have an operational hypersonic weapon by 2023. The U.S. Department of Defense sources claims that the U.S. hopes to complete the deployment of the first hypersonic weapons by 2025.

Artist's concept of hypersonic missile (Image Credit: Lockheed Martin)

Russia's Project 23900 Amphibious Assault Ships

Russian Naval Force's advance universal amphibious Ivan Rogov-Class landing and assault ships set to become Russia's Flagship for its Black Sea Fleet. The Project 23900 amphibious assault ships will receive the names "Mitrofan Moskalenko" and "Ivan Rogov".

According to the reports, all necessary infrastructure is being prepared at the Sevastopol for harboring the ship and Mitrofan Moskalenko is being prepared at Zaliv Shipyard. The exact date and process have not been made public yet.

The ships will fill the role of French-made Mistral-class Helicopter Carrier as the Flagship for the Russian Black Sea Fleet.

The contract for the Mistral-class Helicopter Carrier between France and Russia started in 2011. However, later in 2014 then French President Francois Hollande canceled the contract over the diplomatic dispute between Russia and France due to the Ukraine crisis and sanctions issue. Afterward, Russia started building its own Helicopter Carrier Ship for the Black Sea Fleet that is expected to cost $657 Million.

Mitrofan Mokalenko is a part of Project 23900 LHD that is expected to build two new Ivan Rogov-Class amphibious assault ships that can operate in both warm Atlantic waters as well as Icy Waters of the Arctic Sea. In total the two ships under the project 23900 will cost approximately 100 billion rubles.

Official rendering of the Project 23900 LHD displayed during the laying ceremony at the Zaliv Shipyard LLC in Kerch on July 20, 2020. (Image Credit: Zelenodolsk Design Bureau)

According to the Russian Ship Building cooperation, the ships far exceed the capabilities of its French counterpart that was initially planned to commission in its place. The ship is 220 meters long and has a displacement capacity of over 20 thousand tons, which means it can transport up to 20 heavy helicopters, tanks and other military vehicles and up to 1000 boarded marines.

The main Ivan Rogov-Class amphibious assault ship would be handed over to the Russian Navy in 2025, and the second one is expected to enter service in 2027, sources told Russia's TASS news agency.

Ka-29 Helicopter landing on the ship of project 11711 "Ivan Gren" undergoing tests in the Baltic Sea. (Image Credit: Vitaly Nevar)

Key Features of Mitrofan Moskalenko Helicopter Carrier:

- Mitrofan Moskalenko is 220 meters long, has a 33 meters Beam and 7.5 meters of Draught.
- It has a range of 5200 nautical miles or 9700 km at an economical cruising speed.
- This vessel's sea endurance is up to 30 days
- The ship can reach the speed up to 20 knots
- The ship has a hanger deck that enables it to accommodate up to 20 heavy helicopters.

Air Defense System:

- 100 mm A190 Naval Gun
- Osa-M surface-to-air missile system (1 × 2 launchers, 20 missiles)
- Short Range Air Defense Kashtan 30mm Close-in weapons system (CIWS)
- Pantsyr-M Air Defense Missile/Gun System
- Ship is expected to sail with Ka-27 ASW, SAR Utility helicopter, Ka-29 assault and transport helicopter, Ka-31 Airborne early warning helicopter, and Ka-52K attack helicopter.

Electronics and Sensors:

- E-Band Surveillance Radar
- Two I-Band Navigation Radars
- G-Band Fire Control Radar (for 76mm Gun)
- H/I-Band Fire Control Radar (for 30mm Guns)
- F/H/I-Band Fire Control Radar (for Osa-M Missile System)
- 17 channel radio suite
- Optronic Fire Control System
- Electronic Warfare System with Electronic Support Measures (ESM).

Russia's Hypersonic Weapons Development

Russia is leading the hypersonic arms race with several successful tests of hypersonic missiles and hypersonic glide vehicles (HGV). Moscow is near the completion of hypersonic cruise missile tests and Russian President Putin said that the deliveries to the Russian Navy will begin in 2022.

> ***"Now, it is especially important to develop and implement the technologies necessary to create new hypersonic weapons systems, high-powered lasers and robotic systems that will be able to effectively counter potential military threats, which means they will further strengthen the security of our country"*** – Russian President Vladimir Putin.

Russian military sources claim that Moscow has at least two operational hypersonic missiles in its arsenal and working to add additional missiles to its inventory of hypersonic weapons between 2022-23.

On October 4, 2021, the Russian Navy successfully conducted the first-ever test launch of a Tsirkon (Zircon) hypersonic missile. The Severodvinsk nuclear submarine performed two launches of the Zircon cruise missile at mock targets in the Barents Sea, Russian Defense Ministry said.

Russia Northern Fleet test-firing a Tsirkon hypersonic missile from the White Sea. (Image Credit: Russian Defense Ministry/TASS)

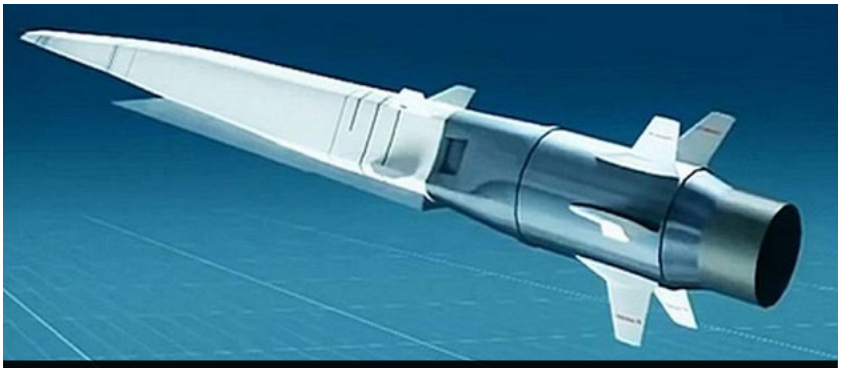
The test marked Tsirkon's first launch from a submarine as it has been earlier test-fired from a navy frigate. "The second test firing of the hypersonic cruise missile Zircon was carried out by the crew of the nuclear submarine missile cruiser Severodvinsk for the first time from an underwater position, from a depth of 40 meters, in the waters of the White Sea at a conditional sea target in the Barents Sea," the Russian military said.

The Russian Defense Ministry's official statement said "The test-firing of the Zircon missile from a nuclear submarine was deemed successful." The statement added: "According to the objective monitoring data, the flight course of the missile has matched the specified parameters. The conditional target has been hit."

After successfully testing Tsirkon hypersonic missile, Russia's defense ministry released a grainy video showing the missile lighting up the night sky during the launch.

> ***"The tasks of the launch were fulfilled, the test-fire was recognized as successful and the missile was registered to accurately hit the target… The missile flew to a range of 450 km, climbing to a maximum altitude of 28 km. The flight lasted four and a half minutes. The missile gained a hypersonic speed of over Mach 8 [eight times the speed of sound]"*** - Russian Chief of General Staff Army General Valery Gerasimov.

The Tsirkon cruise missile can be launched from naval ships, submarines, aircraft, and land-based mobile launching systems and has the capability to fly at a low altitude with the help of a scramjet-powered maneuvering system. According to military sources, Russia is also working on a land-based version of its Tsirkon hypersonic missile.



Artist rendering of waverider-type hypersonic missile 3M22 Tsirkon. (Image Credit: Channel One Russia via TheDrive)

Russian President Vladimir Putin said that its deployment would significantly boost Russian military capability. He described it as part of a new generation of missile systems and a key component of Russia's new "invincible" weapons.

During State-of-the-Nation Address to the Federal Assembly in February 2019, the Russian President said that the Tsirkon missile would be capable of flying at Mach 9 (nine times the speed of sound) and has a range of 1,000 kilometers (620 miles).

Tsirkon hypersonic missiles have been developed by the Reutov Research and Production Association of Machine-Building (NPO Mashinostroenia). Russia's Defense Ministry said the delivery of Tsirkon hypersonic missiles will be fulfilled by 2025. Tsirkon hypersonic missiles are expected to enter service first with the Russian Navy on the Project 22530

Gorshkov-class and then the Project 08851 Yasen-M-class cruise missile submarines.

According to Russia's Chief of General Staff Army General Valery Gerasimov, Russian Defense Ministry plans to continue improving its hypersonic capabilities and conduct more flight tests of the Tsirkon shipborne hypersonic missile system.

Russia has also paced its efforts to deploy its Avangard HGV, which is capable of carrying both conventional and nuclear payloads. The Avangard HGV that requires a propulsion system had been in the testing process since 2015. In 2018 Avangard carried by a UR-100UTTKh ICBM was launched from Dombarovsky Air Base and the glider flew at 27 times the speed of sound.

In 2019 Russian missile regiment armed with the Avangard HGV officially entered combat duty. According to the Chief of Russia's Strategic Missile Forces General Sergei Karakayev, the Avangard missile system was deployed at a missile division in central Russia's Orenburg region 1,500 kilometers southeast of Moscow.

Experts have noted that Russian missiles are much faster and more maneuverable than the U.S. and Chinese hypersonic missiles, and Avangard is specifically designed to counter U.S. ballistic missile defenses. Russia plans to add a second regiment of six Avangard systems by 2027 and seeks to build a total of 60 hypersonic weapon systems.

An image from Russian military video footage shows the Avangard hypersonic missile system preparing for launch. (Image Credit: Russian Defense Ministry/TASS)

China's 20-Series Aircraft

China is stepping up the production of its most advanced "20" series aircraft family. China's 20-series military aircraft includes the fifth-generation J-20 stealth fighter jet, the H-20 subsonic stealth bomber, the Y-20 transport plane, the Z-20 utility helicopter, and a series of advanced UAVs, such as the GJ-11 drone.

J-20

The twin-engine J-20 first flew in 2011 and was introduced to the public during a flyby at a 2016 airshow. The jet was declared combat-ready in 2018. In 2021 China upgraded its J-20 fighter aircraft with domestic-made engines. J-20 Mighty Dragon made its debut with domestically built engines at the 13th China International Aviation and Aerospace Exhibition (Airshow China 2021) held from September 28 through October 3. This marks the end of the reliance on the Russian AL-31 engines as China replaces the jet with complete homegrown technology at the event, which "will significantly contribute to the mass production and the performance boost of the aircraft."

The J-20 maneuvers displayed the outstanding performance of the aircraft at low altitude and high speed, performing tight turns and under large flight angles, said Senior Colonel Li Jikuan, commander of the J-20s' flight performance at the airshow that commemorated the 100th anniversary of the founding of the Communist Party of China.

The J-20 Mighty Dragon stealth fighter (Image Credit: PLAAF/Twitter)

China has built at least 150 J-20 stealth fighters as of 2021 and has not disclosed any new production rates. Deputy designer of the aircraft Wang Haitao told Global Times that China's aviation industry could satisfy any level of demand of the Chinese People's Liberation Army (PLA) Air Force for J-20. While, Chief Designer of the J-20 Yang Wei said that the flight performance was just a "modest show" and the J-20s "did not show off their full capabilities' at the Zhuhai airshow.

Wang said advanced aircraft development usually takes a long time, but "particularly for equipment like the J-20, we need to do it faster in all aspects, including designing, production, testing, and crafting." The fighter has recorded "outstanding" performance in stealth, sensors, and firepower, Global Times said.

The domestically-built engines can also provide more powerful thrust while the serrated nozzles will improve the stealth capability. A Chinese expert Zhang Xuefeng noted that "J-20s showcased some of the most practical maneuvers in real combat scenarios as these moves would allow the aircraft to better lock on targets with missiles."

In October 2021, China unveiled the twin-seater variant of its J-20 stealth fighter aircraft. Several video clips and pictures of the world's first twin-seater stealth fighter plane emerged on Chinese social media platforms. Experts noted that the new variant of the J-20 projects China's capabilities to produce and employ indigenous technology in its most advanced aircraft.

At present, China's Chengdu J-20, Russia's Sukhoi Su-57, and America's Lockheed Martin F-22 and F-35 are the only operational 5th generation fighters in the world. Western experts described the development as an attempt by Beijing to push its capabilities to rival the United States F-22 and F-35. The U.S. Air Force already has more than 280 F-35As and plans to acquire 1,763 as compared to China's 150 J-20s.

Y-20

China's Y-20 Kunpeng strategic large transport aircraft made its first flight in 2013 and debuted in 2014 during the Airshow China. China's PLA Air Force received its first large multi-role transport aircraft in July 2016, since then Beijing has been testing different engine types for the aircraft and the airlifter is playing a critical role in developing China's long-range delivery capabilities. According to experts, the Y-20's new

PLA Air Force's transport aircrat Y-20. (Image Credit: China's MOD/Xinhua)

engines will enhance the range and endurance, and increase the cargo capacity of the plane. Experts believe that China's massive transport plane can carry multiple armored vehicles, or a Type 99 tank, or at least three parachutable ZBD-03 airborne infantry fighting vehicles.

According to China's CGTN, the Y-20 aircraft can transport military personnel and supplies under complicated weather conditions and with the improved electronic system and engines, the transport plane is capable of flying at a speed of 700 kilometers per hour and cover 7,800 kilometers. The Y-20 aircraft was also used to carry medics and supplies to Wuhan during the height of the COVID-19 pandemic in February 2020.

H-20

The reports of China's Xian H-20 bomber first appeared in 2016 and international military experts projected in 2020 that the H-20, which is going through the final testing phase, would become one of the most advanced stealth bombers in PLA's inventory.

Although, very few details of the H-20 have been made public, according to images published in China North Industries Group's magazine Modern Weaponry, the next-generation H-20 strategic bomber has an airborne radar at the front and two stealth air intakes on both sides, two adjustable tail wings, and covered with radar-absorbent material.

According to reports, China's H-20 bomber likely has a take-off weight of at least 200 tones with a payload of up to 45 tones. The H-20 is capable of flying at subsonic speeds and firing powerful hypersonic stealth cruise missiles. The bomber can also carry both nuclear and conventional missiles. Unverified reports have claimed that the Chinese Air Force is conducting final trials of H-20 strategic stealth aircraft at Hotan airbase in Eastern China.

China's Harbin Z-20 Helicopter carrying KD-10 air-to-ground missiles. (Image Credit: QiuqiuQ30/Weibo)

Z-20

China's Z-20 helicopter is designed by Harbin Aircraft Industry Group. The multirole helicopter made its first public appearance at the Chinese National Day parade in October 2019. The Z-20 is a medium-lift helicopter with double indigenous engines and it can be used for emergency rescue missions, air tours, and traditional agricultural work, as well as flight training.

According to Chief Engineer at Harbin Aircraft Industry Group Wang Xibao, the Z-20 helicopter "uses many technologies that should be considered advanced in the world, including the active vibration control, fly-by-wire, low-noise design for rotor and high-performance aerodynamic design of the rotor."

GJ-11

China's Hongdu GJ-11 (Sharp Sword) stealth armed reconnaissance drone is an unmanned combat aerial vehicle jointly designed by Hongdu Aviation Industry Group, Shenyang Aircraft Design Institute, and Shenyang Aerospace University.

During the Airshow China 2021, the GJ-11 drone opened its weapons bays for the first time. The stealth drone has two weapons bays that are symmetrically positioned between the GJ-11's landing gears. The drone's flying wing design is similar to the U.S. B-52 bomber and it can carry various precision weapons and ammunitions, including larger guided precision air-to-ground missiles.

A Chinese military expert Zhang Xuefeng told the Global Times that despite its small body, the GJ-11 has a long range. "The GJ-11 is one of the most advanced stealth attack drones" and it "has high subsonic cruise efficiency" Zhang added.

Gongi-11 stealth attack drone displayed at Airshow China 2021 on September 30, 2021. (Image Credit: Aly Song/Reuters)

China's Hypersonic Weapons Development

China is currently the world leader in hypersonic weapons technology and according to the U.S. Pentagon officials, Beijing is conducting hundreds of weapons tests and developing hypersonic technology at a stunning pace. Although the U.S. and Russian hypersonic weapon programs started in the early 2000s, during the last decade, China has paced efforts to catch up with two major military powers and even exceeded them in the hypersonic arms race.

China's hypersonic development is focused on Hypersonic Cruise Missiles (HCM) with air-breathing engines and Hypersonic Glide Vehicles (HGV) that are launched into the upper atmosphere and then glide toward a target.

Beijing first demonstrated its operational hypersonic capability during the 2019 National Day Military Parade when its defense forces displayed DongFeng-17 (DF-17) medium-range ballistic missiles equipped with a hypersonic glide vehicle.

China has already developed hypersonic capable weapons and deployed in the form of DongFeng-17 or DF-17, a medium-range missile system that is equipped with hypersonic glide vehicles. Although China's hypersonic missiles prototypes have been in existence since 2014 under DF-ZF and WU-14 programs, DF-17 is the first proclaimed hypersonic weapon developed entirely by China.

The DF-17 is an 11 meters long road-mobile missile that has the capability to reach speeds from Mach 5 to Mach 7 and can carry both nuclear and conventional warheads. The DF-

Military vehicles carrying the DF-17 hypersonic ballistic missile during a parade in Beijing celebrating the 70th anniversary of the founding of the People's Republic of China. (Image Credit: Xinhua News Agency)

17 can locate and hit its target within the range of 1800-2500kms while having a maximum weight capacity of 15,000 kg. According to sources, the missile system was commissioned to China's People's Liberation Army in 2019.

China is pursuing various hypersonic missiles and delivery systems and in 2018 alone, China tested three hypersonic vehicles with different aerodynamic properties. In May 2018, China's National University of Defense Technology exhibited a prototype "Lingyun" hypersonic missile at the 18th National Science and Technology Week in Beijing. According to military experts, Lingyun is an air-breathing system that uses a scramjet engine. It can reach the top speed of Mach 6 and execute a series of in-flight maneuvers. China seeks to achieve the operational capability of its hypersonic vehicle by 2025. August 2018, China successfully tested its Xingkong-2 (Starry Sky-2) waverider hypersonic vehicle that derives lift from its own shockwaves.

In October 2020, a video surfaced on the internet showing China's PLA Air Force's H-6N bomber carrying an unknown payload that appears to be an Air-Launched HGV. Although China did not confirm the existence of such a hypersonic weapon, it has been working on several air-launched hypersonic missile programs.

More recently in October 2021, China tested its new space capability with the hypersonic missile. During the test, the missile circled the globe in a low-earth orbit before speeding towards its target. Although the missile missed its target by 24 miles, the U.S. officials expressed concerns over China's hypersonic capabilities, calling it "far more advanced than the U.S." and termed China's unprecedented advancement in the hypersonic weapons technology as a "Sputnik Moment", which is a common notation used by the U.S. official to describe their lack of abilities in certain technology compared to its competitors. China on the other hand has denied any such advancements and termed the test as a routine space mission.

The older J-12 hypersonic wind tunnel in Beijing is working with the new facility to develop hypersonic aircraft (Image Credit: Handout/SCMP)

China is also investing heavily in hypersonic ground testing facilities, and currently operates at least five hypersonic wind tunnels that are capable of reaching speeds up to Mach 15. These wind tunnels are an essential tool for researching, testing, and developing hypersonic technology. China has also completed a new wind tunnel with the capability to reach the top speed of Mach 25. According to reports China's new JF-22 hypersonic wind tunnel, which is expected to be completed in 2022, will be able to simulate a speed of Mach 30, making it one of the most advanced wind tunnels in the world.

Japan's Maya-class AEGIS Destroyer JS Haguro DDG 180

Japan's second and final Maya-Class and 8th AEGIS Destroyer JS Haguro DDG 180 was commissioned to Japanese Maritime Self-Defense Force (JMSDF) on March 19, 2021. JS. Haguro DG 180 was handed over to Escort Flotilla 4 at Isogo Shipyard and it will be based at Sasebo, a city located in Nagasaki Prefecture.

The project for the new and improved AEGIS destroyers was commenced in 2015 and the first Maya-class, DDG 179 was commissioned on March 19, 2020. Japan's new class destroyer costs around $1.5 billion each unit, and the ships are equipped with Ballistic Missile Defense (BMD) capabilities.

The Maya-class destroyer is designed at 170 meters, has full load displacement of 10,250 tons, and operates at Combined Diesel-Electric Gas (CODLAG) propulsion system. The ship has a maximum width of 21 m, depth of 13 m, a draft of 6.4 m, and it can be operated to the optimum ability with a crew of 310 sailors. The Maya-class destroyers have been limited to two units, to pave way for the next generation of AEGIS Destroyers. JS Haguro DDG 180 is equipped with state-of-the-art weaponry that includes 96 Cells of Mark 41 Vertical Launching System with 64 Cells forwards and 32 Cells facings backwards.

The destroyer was built by a Japanese shipbuilding marine engineering and Service Company, Japan Marine United Corporation. JS Haguro DDG 180 is an improved variant of the Atago-class guided missile destroyer, with the Aegis Baseline 9/BMD 5.1 system and the U.S.-made Cooperative Engagement Capability that can combine sensor data from different platforms into a single image.

Japan's Maya-class JS Haguro (DDG-180) sailing for sea trials. (Image Credit: Saturn_Ecplise/reddit)

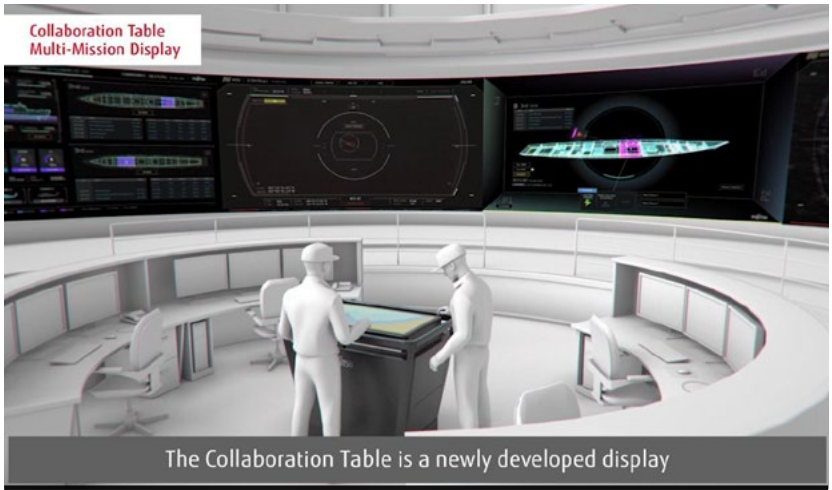
Maya-class JS Haguro DDG-180. (Image Credit: Takao/Twitter)

Weapons on board:
• SM-6 / RIM-174 Standard Extended Range Active Missile System (ERAM)
• SM-2MR Block IIIB, Surfaced to Air Missile System
• HOS-302 triple torpedo tubes (Mk-46 or Type 73 Torpedoes)
• Type 90/17 Anti-Ship Missile
• Type – 07 Vertical Launch, Anti-Submarine Rocket
• Mk 45 Mod 4 127mm Main Naval Gun
• 2 Phalanx CIWS.

SM-6 is a Japanese locally produced, multi-mission missile system that can be used for both surface-to-surface and surface-to-air targets. The missile system was subjected to be completed in FY2019, but due unavailability of some parts from the U.S. it got delayed. The system is now functional and installed on the Maya-class destroyers.

Another distinct feature of the Maya-class destroyers is the Collaborative Table, which is a hi-tech state-of-the-art system designed by the Japanese company Fujitsu with the partnership of American arms manufacturer Lockheed Martin. The Collaborative Table is a multi-functional display unit that is used for mission planning and other important tasks.

Collaborative Table features:
• Situational awareness – Tactical Situation (TACSIT)
• BMD mission planning, engagement scheduling and status display
• Damage control display, coordination and capability restoration support
• Data provider for remote engagement mission planning
• C2BMC coordination
• Non-AWS combat system display (GCCS, JTT, EW, CDLMS).



Collaborative Table multi-mission display console for Maya and Ashore. (Image Credit: Fujitsu-LM Union/via Tha Bos Twitter)

Although the Maya-class destroyers are not fitted with conventional ECM (Electronic Counter Measure) System, it has the capability of NOLQ-2C ESM (Electronic Support Measures) and MK-137 Decoy Launchers for electronic warfare. The Maya-class Destroyers are also equipped with AN/SQ-53C bow sonar state-of-the-art Multi-Function Towed Array (MFTA) sonar system for detection of submarines and underwater objects. The Maya-class destroyers are expected to be paired with SH-60K maritime helicopter.

Rise of the Turkish Drone Technology

Turkey has become one of the world's top manufacturers of armed drones, gradually working its way up in the last 15 years. The country has now gained a highly prestigious reputation in the worldwide drone market dominated by U.S., Israel, and China.

Turkey has managed to become one of the few countries in the world with topnotch UAV technology, according to Temel Kotil, head of the Turkish Aerospace Industries (TAI), one of the two leading drone makers. Aselsan, STM, and Baykar Makina are some of the other Turkish defense companies manufacturing drones.

Turkey's President Recep Tayyip Erdogan signs a drone at a military airbase in Batman, Turkey. (Image Credit: Murat Cetinmuhurdar/AP)

Turkish drone technology reached a milestone when Bayraktar Tactical Block 2 (TB-2) took its first flight in 2014. The Baykar Defence Company's TB-2 UAV can be operated for reconnaissance, surveillance, and intelligence missions and has been proven to be highly effective for carrying out strikes and transferring ammunition to the battlefield. The TB-2 drone is considered cheaper compared to its competitors with the cost of $5 million per unit. The drone can effectively eliminate the enemy's armored vehicles, artillery units, battle tanks, and mobile air defenses.

Turkey's drone fleet has been labeled as "combat proven" following the strikes carried out in Syria and Libya. "The precision and the lethality of the Turkish drone strikes in Idlib (Syria) were remarkable. The massive attacks against Assad regime forces also humiliated the Russians, whose technology, including air defense systems designed to counter such threats, proved useless" according to MEI.

Turkey's armed forces also gained global attention when its drones played a central role in shifting Libya's civil war in favor of the U.N.-recognized Tripoli-based Government of National Accord (GNA). Most recently, during the Nagorno-Karabakh war, Turkish drones again played a key role in Azerbaijan's offensive against Armenian forces. "Drones have done much to promote Turkey's rise as a regional power in the year 2020," according to American political scientist Francis Fukuyama.

Drones are now considered an integral part of Ankara's hard power diplomacy. "Armed drones electronic war systems have helped Turkey to carry out a more hard power-oriented foreign and security policy" relying on its homegrown technological edge, according to Sinan Ulgen, chairman of Istanbul-based Center for Economics and Foreign Policy Studies.

A more significant development was reported in March 2020 in Libya, where the first use of artificial intelligence-based drones was believed to have occurred to kill troops. UN reports suggest that Turkey's new Kargu-2 drone, developed by STM, may have "hunted down and remotely engaged" soldiers and convoys fighting for Libyan general Khalifa Haftar. "The lethal autonomous weapons systems were programmed to attack targets without requiring data connectivity between the operator and the munition: in effect, a true "fire, forget and find capability," says the UN report.

A promotional image of the Turkish drone Kargu that can detect and destroy its target with a smart algorithm. (Image Credit: STM)

According to Kargu-2 drone manufacturer STM, Turkey's new generation kamikaze drone is defined as a rotary wing national striker UAV solution that can operate autonomously or remotely and can be used for asymmetric warfare and counterterrorism operations.

Turkish military sources confirmed that Kargu-2 had been used in Libya but denied that the drones were allowed to use artificial intelligence to select and hit targets. The autonomous track

and targets on the basis of facial recognition and artificial intelligence is a big technological leap that will shape future warfare.

In August 2021, the Turkish military added another indigenous armed drone to its inventory. Turkey's Baykar Defence Company launched its new Akinci (Raider) drone with a more advanced system than any previous Turkish drone. The Akinci is capable of flying alongside fighter jets at higher altitudes and for longer durations and can attack both air and ground targets.

Turkey's defense industry has received a major boost due to tremendous strides in its national unmanned aerial vehicle (UAV) development program in the past decades. Most of the components of Turkey's drones are manufactured domestically as part of efforts to cut dependence on foreign companies.

Turkey has also made significant progress in developing UAV helicopter technology and in February 2021 Turkey's TAI unveiled the first prototype of its unmanned, all-electric T629 attack helicopter. The T629 six-ton attack helicopter would be equipped with 70 mm unguided missiles and L-UMTAS anti-tank missiles.

The T629 could be potentially used for anti-ship and anti-submarine warfare (ASW), search-and-rescue, and to support Turkey's existing manned T129 ATAK helicopters by flying reconnaissance/scouting, light transport, and reconnaissance missions.

Turkey's new electric-powered, unmanned T629 military helicopter developed by Turkish Aerospace Industries. (Image Credit: TAI)

Pakistan's HQ-9/P Air Defense System

In the recent development of the defense collaboration between Pakistan and China, Pakistan received an undisclosed number of the latest HQ-9/P Ground-to-Air Defense System on October 14, 2021. HQ-9/P is a High to Medium Air Defense System (HIMAD). According to Pakistan military's media wing, Inter Services Public Relations (ISPR, such air defense capability will enhance Pakistan's overall defense capability.

The Hong Qi-9 or HQ-9 (Red Banner-9) is a High to Medium Air Defense System (HIMAD) with active radar. The HQ-9 system has four different types of radar including, H-200 mobile engagement radar, Type 120 low-altitude acquisition radar, Type 305A 3D acquisition radar, and Type 305B 3D acquisition radar. The HQ-9's guidance system is composed of inertial guidance plus mid-course uplink and active radar terminal guidance systems.

According to the Pakistan military's media wing, Inter-Services Public Relations (ISPR), such air defense capability will enhance Pakistan's overall defense capability. The ISPR official communiqué read: ***"Induction of HIMADS will significantly enhance Comprehensive Layered Integrated Air Defense (CLIAD) shield of aerial frontiers of Pakistan as the system is fully integrated through a well-knit Digitized System on its inventory."***

The Hong Qi-16 Surface to Air Missile System (Image Credit: Pakistan Army)

Pakistan's ISPR said in a statement that the HQ-9/P has remarkable flexibility and precision with a high single-shot kill probability. It also features advanced electronic equipment and software for increased accuracy.

The HQ-9/P can accurately intercept multiple threats such as air-to-ground missiles, helicopters, aircraft, unmanned aerial vehicles (UAVs), guided bombs, cruise, and ballistic missiles and beyond visual range weapons at vertical ranges over 100 kilometers. According to ISPR, the HQ-9/P has remarkable flexibility and precision with a high single-shot kill probability. It also features advanced electronic equipment and software for increased accuracy.

Highlighting the criticality of air defense in the overall defense of Pakistan, the Chief of Army Staff (COAS) General Qamar Javed Bajwa said the exemplary synergy between Pakistan Air Force and Pakistan Army makes the country's air defense impregnable in the emerging threat scenario. "Pakistan–China strategic partnership and defense collaboration is a factor of stability in the region," COAS Bajwa added.

The HQ-9/P is a variant of China's HQ-9 series, which is considered one of the world's most advanced surface-to-air missile systems. The HQ-9/P is built on the same principles as Russia's S-300 and America's Patriot Surface to Air Defense Systems, and it is equipped with anti-stealth capabilities.

A screenshot from footage released by the ISPR on October 14 showing a Pakistan Army transporter vehicle carrying missiles for the HQ-9/P SAM system. (Image Credit: ISPR via IRIA)

Similar to the Russian S-300V, the HQ-9 is a two-stage missile. The first stage has a diameter of 700 mm and the 2nd stage 560 mm, with a total mass of almost 2 tons and a length of 6.8 m. The missile is armed with a 180 kg warhead, has a maximum speed of Mach 4.2.

According to sources, larger and more capable formations can be made by merging a variety of equipment with the HQ-9/P system, including command post, site survey vehicle, extra transporter or loader vehicles with four missiles each.

HQ-9 is manufactured by China Precision Machinery Import-Export Corporation (CPMIEC) and it has several variants with enhanced technology and ranges from 100 km to 300 km.

China has developed multiple variants of the missile system, including HHQ-9A and HHQ-9B, and is currently working on the naval version of the system as HQ-9C, which is expected to be armed with fully active radar homing.

Iran's Alborz and Borhan Air Defense Systems

In recent years, Iran has accelerated efforts to conduct research and pushed its military modernization process forward with several tests to improve its defense equipment. The military experts and technicians of the Islamic Republic have made significant progress in manufacturing wide-ranging indigenous equipment, allowing the country's armed forces to be self-sufficient in the weapons development and air defense fields.

On September 1, 2021, the Islamic Republic of Iran Army's Air Defense Force revealed a new surveillance radar and command-and-control (C2) system.

has been developed for short-range, low-altitude air defense. The system weapons center is at low altitude as the last line of command in the point-defense of the command-and-control air defense network.

According to Iranian news agencies, the Borhan system receives and analyzes data from all sources, and then provides information to the highest levels of command to make decisions in the shortest possible time to communicate the necessary decisions to carry out the mission and destroy the target.

The Borhan system has an effective detection and processing capability, which makes it highly efficient in deceiving and destroying air targets. The system also sends this information to missile systems by combining data received from electro-optical systems with data received from radar systems, then tasks the appropriate weapon system with intercepting the target. In addition to the ability to detect the target in passive mode, the system also has the ability to send commands to deal with electronic disruption.

Iran's Alborz radar and Borhan defense system (Image Credit: Tehran Times)

Another indigenous product "Alborz" was revealed in September by Iran's defense forces. Alborz is a 3D phased array radar that has a range of 450 km and can track 300 targets at the same time, including low-altitude ones with small radar cross-sections. The displayed radar had a large planar antenna mounted on a trailer connected to a second trailer that apparently carried its power generator and served as a control station.

Iranian official sources also declared that Iranian armed forces tested a new version of its Mesad-16 surface-to-air missile (SAM) system. Iranian news agencies announced that a new version of the Mersad-16 system had been successfully tested in the central desert. The Commander of the Air Defense Force responsible for the operation General Mohammad Khoshqalb was quoted as saying that the system includes new technology to counter electronic warfare and simultaneously intercept several targets. He added that the Mersad-16 was integrated into an air defense network for the first time during the test.

An Iranian Mersad-16 surface-to-air missile system is seen at a testing range in Semnan province, Iran. (Image Credit: Islamic Republic of Iran Army)

The Mersad-16 medium -altitude surface-to-air missile system can detect and act on enemy targets at any altitude in real time. Compared with previous generations of Mersad, the Mersad-16 system can be installed on trucks, using new Iranian radars (Hafez and Najm-804), launchers and "Shalamcheh 2" missiles.

Air Defense Commander Brigadier General Alireza Sabahi Fard said: ***"Iran has developed such advanced air defense equipment that it can monitor hostile activities even at the bases of the enemy."***

Iranian General warned its adversaries that any "reckless decision against Iran" would be dealt with serious response, and claimed that its enemies "will face a major defeat".

Iranian forces have intensified efforts to develop its domestic defense industry due to the United Nations Security Council sanctions that restricts Iran from purchasing weapons systems from other countries. In this regard, General Alireza Sabahi Fard stated that the Iran's "air defense has reached such a level of combat capabilities that it does not need help from other countries."

Over the last few years, Iranian defense industry has produced indigenous fighter aircrafts, missiles, warships, UAVs, and with recent leaps in high-quality air defense systems, Iran has evidently joined the arms race headed by major military powers in the region.

India's Anti-Submarine SMART Torpedo System

India is a major military power in the region and with the successful test of its Supersonic Missile Assisted Release of Torpedo (SMART) on October 4, 2021, the Indian defense ministry is pushing forward to add advanced missiles and military products to its arsenal.

The test of the SMART Torpedo system comes after a successful test of India's nuclear warhead capable missile 'Shaurya' that has the capability to hit a target up to 1000 kilometers. India's Defense Research and Development Organization (DRDO) proclaimed the SMART system to be a "Game Changer" in submarine warfare.

> ***"The DRDO India has successfully flight tested the Supersonic Missile assisted release of Torpedo, SMART. This will be a major technology breakthrough for stand-off capability in anti-submarine warfare."*** – Indian Defense Minister Rajnath Singh.

India's Defense Technology Development Agency tests a conventional torpedo strapped to a supersonic missile. (Image Credit: Indian Defense Ministry)

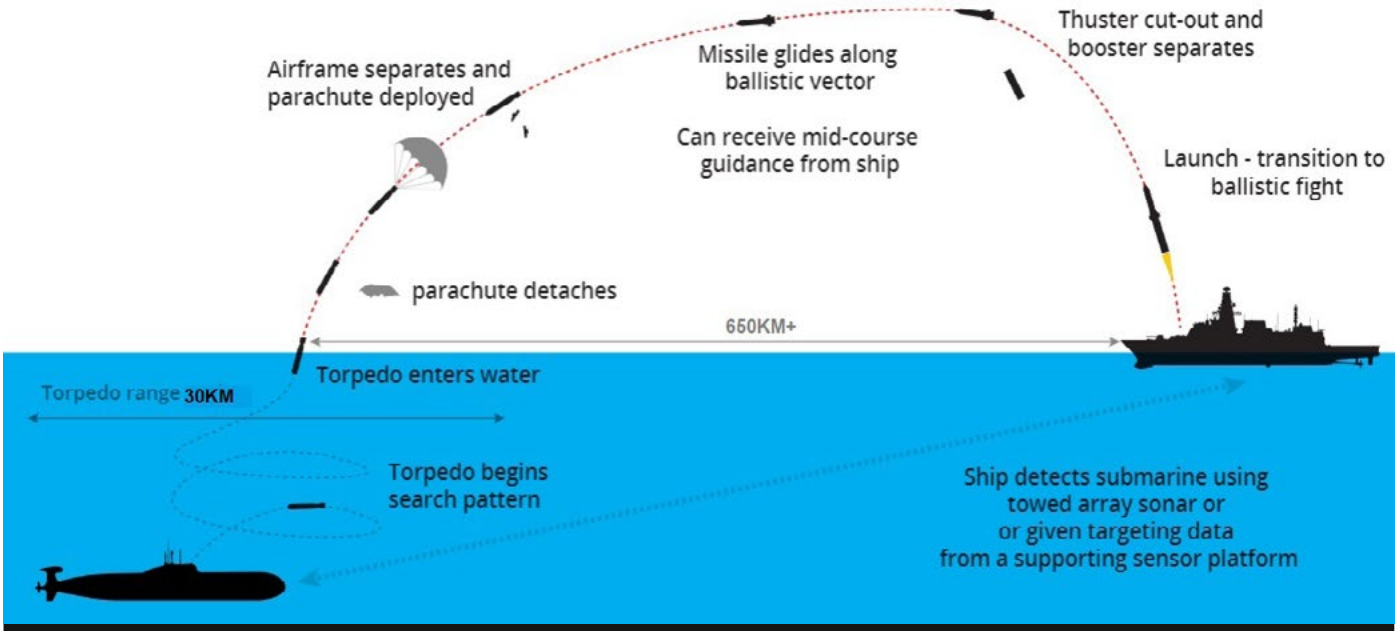
The SMART torpedo system has an adaptable mobile launching system to engage a lightweight anti-submarine torpedo operation. The initial test for SMART torpedo was carried out off the APJ Abdul Kalam Island, previously known as Wheeler Island, at Odisha Coast.

According to the Indian Defense Ministry, the SMART torpedo system has met all its objectives during the testing phase. The representative of Ministry of Defense also added that the missile system would be an essential shore-based support for the Indian Navy in case of a naval standoff with China or Pakistan. The system has been designed to act as a quick response

measure in order to counter any act of aggression from Gwadar and Karachi, Pakistan.

The missile can be launched from both truck and ship bases. It flies at a low altitude and maintains a two-way link with its launching station in order to locate the target with optimum accuracy.

The SMART system is a combination of a solid-fuel rocket embedded with a weight torpedo that ranges up to 650 kilometers. The SMART missiles cover most of its pathway being airborne and as it gets closer to a predefined target it prepares a lightweight anti-submarine torpedo to destroy the target. The torpedo launched by the SMART missile system acts the same as a regular Light Weight Torpedo (LWT) to find its target underwater.



SMART Missile System – Graphis Illustration (Image Credit: Defense Decode/Twitter)

A number of DRDO laboratories had been working on the SMART project including India's Defense Research and Development Laboratories (DRDL), Research Center Imarat (RCI) Hyderabad, The Aerial Delivery Research and Development Establishment (ADRDE) Agra, and Naval Science and Technology Laboratory (NSTL) Visakhapatnam. All different components of DRDO have worked on different aspects of the SMART torpedo system.

Indian Defense Ministry and DRDO have also been working on several joint projects to develop hypersonic missile systems and directed-energy weapons. India has made significant progress in this front by testing canister launched hypersonic surface-to-surface tactical missile 'Shaurya', and 'DURGA II' directed-energy weapon.

North Korea's Hwasong-8 Hypersonic Missile

North Korea successfully test-fired a newly developed hypersonic missile "Hwasong-8" on September 28, 2021. According to North Korean state news media KCNA, the latest launch marks the country's third missile test in September 2021, following a new type of cruise missile, and a new train-launched ballistic missile system.

Hypersonic weapons are considered the next generation of arms aimed at countering adversaries with increased precision without giving interceptors the time to react and depriving the counter mechanisms.

The North Korean regime attaches great importance to its missile development program, terming the new missile as one of the "five most important" new weapons systems laid out in its five-year military development plan.

According to KCNA, Hwasong-8 was topped with a hypersonic gliding vehicle (HGV) warhead. Hypersonic craft travels at least five times faster than the speed of sound, or Mach 5, and are highly maneuverable. They're much tougher to track and intercept than intercontinental ballistic missiles, which follow predictable trajectories.

North Korean official news agency said, "the development of this weapons system... [has increased] the nation's capabilities for self-defense in every way". North Koreans called the

Test launch of North Korea's Hwasong-8 HGV (Image Credit: KCNA via NK News)

missile a "strategic weapon", which usually means it has nuclear capabilities. North Korea also achieved a new milestone during the test, by introducing a missile fuel ampoule, which allows missiles to be pre-fueled and then sent to the field in canisters.

"In the first test launch, national defense scientists confirmed the navigational control and stability of the missile in the active section and also its technical specifications, including the guiding maneuverability and the gliding flight characteristics of the detached hypersonic gliding warhead," KCNA reported.

According to South Korean military officials, North Korea fired the missile off its east coast towards the sea, as the country's leadership called on South Korea and the U.S. to stop "double standards" on weapons programs to resume talks.

The U.S. Special Envoy for North Korea Sung Kim called the North Korean hypersonic missile launch a "destabilizing" move for regional security, and stated that despite the aggressive move by North Korea, the U.S. and its allies seek to engage in denuclearization talks with the DPRK regime.

North Korea's latest hypersonic weapon poses a greater challenge to its adversaries and outmatches the missile defense systems that are deployed by the U.S., South Korea, and Japan. However, South Korea's Joint Chiefs of Staff claimed that North Korea's hypersonic missile "was still at an early stage of development and it will take a considerable period of time before it can be deployed in combat", and suggested that North Korea might conduct additional test firings in the coming months.

South Korean Missile Specialist Chang Young-keun told Reuters news agency that North Korea's Hwasong-8 HGV reached a top speed of "Mach 2.5". Chang Young-keun stated that "The North's HGV technology is not comparable to those of the U.S., Russia or China and for now seems to aim for short-range that can target South Korea or Japan".

Although the United States and South Korean officials claim that they are currently capable of detecting and intercepting North Korean missiles, with the latest test, Pyongyang joined the arms race of hypersonic weapons, which have already been tested by the United States, China, and Russia.

Experts have noted that despite COVID-19 threats and economic slowdown, North Korea has paced efforts to develop its weapons systems. The UN atomic agency experts have also claimed that North Korea has restarted a reactor that could produce plutonium for nuclear weapons. However, despite external pressures, North Korean leaders are committed to advancing the country's nuclear and ballistic missile program.

North Korea test-fired a ballistic missile from a railway-borne missile system in September 2021. (Image Credit: KCNA/ Reuters)

INTERNATIONAL RELATIONS
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Left 1 - Navy christened Littoral Combat Ship USS Nantucket.
(Image Credit: U.S. Navy)

Middle 1 - Russia's Varyag missile cruiser firing a cruise missile.
(Image Credit: Russian Defense Ministry)

Right 1 - The coplanar joined-wing design.
(Image Credit: Aurora Flight Sciences)

Left 2 - U.S. Air Force's X-51A Waverider hypersonic missile.
(Image Credit: Mike Cassidy/USAF)

Middle 2 - Analog air defense radar display.
(Image Credit: iHLS)

Right 2 - Israel's Rafael Spyder system.
(Image Credit: Israel's Ministry of Defense)

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