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Coronavirus casts shadow on missile tests at Odisha's Integrated Test Range

With India restricting travellers from foreign countries, scientists from Israel and Russia had to stay back in their respective countries leading to deferment of both the tests

By Hemant Kumar Rout

Bhubaneswar: The threat of novel coronavirus has cast a shadow on flight testing of at least two missiles that have been developed by India in collaboration with Russia and Israel.

Defence sources said the missiles were scheduled to be test fired from the Integrated Test Range (ITR) off Odisha coast. With India restricting travellers from foreign countries, scientists from Israel and Russia had to stay back in their respective countries leading to deferment of both the tests till the situation normalises.

One of the most happening laboratories of DRDO, the ITR has four launching complexes at Chandipur and Abdul Kalam Island. Apart from ITR, the DRDO has one more unit - Proof and Experimental Establishment (PXE) at Chandipur. Though activities have not been hampered, restrictions have been imposed on movement of staff in groups.

"As the foreign scientists and technical staff remain present during test of missiles developed as joint ventures, the tests have been postponed. Though the trials of indigenously developed missiles will be conducted as per schedule, nothing has been planned this month," the sources informed.

The ITR and PXE have issued guidelines for their scientists and other staff on prevention of coronavirus infection. As part of precautionary measures, bio-metric attendance has been stopped and priority is being given on complete sanitisation of surfaces frequently used by staff members.

ITR Director BK Das said a 20-point charter has been prepared by a high-level committee headed by a senior scientist for management of different on-going projects. "We have completely avoided meeting together and discussion are being done through video-conferencing. All negotiations on finalisation of tenders will be done through Skype," he said.

The ITR chief has also decided to shut down the canteen store department (CSD), where employees gather to buy groceries and other essentials, from Friday till March 31. A squad has been formed to ensure that the staff are using all protective gears inside the lab.

"Since ours is one of the biggest labs in the world, we can not shut it down completely. But we have cancelled non-essential training and conferences. Employees have been directed to avoid public transport. In case of any issue, they can take leave and stay back at home," he added.

Though scientists from Russia, Israel, France and Denmark usually visit the test range for different activities, luckily no one from these countries had come here as there was no mission scheduled in the last two months.

<https://www.newindianexpress.com/states/odisha/2020/mar/19/coronavirus-casts-shadow-on-missile-tests-at-odishas-integrated-test-range-2118966.html>

HAL cuts its profit on Tejas Mark 1A deal by 50%, fighter jets to take to sky by 2022

Defence Ministry Wednesday gave green signal to the purchase of 83 Light Combat Aircraft Mark 1A Tejas from the Hindustan Aeronautics Limited at a cost of Rs 37,000 cr

By Snehesh Alex Philip

New Delhi: The defence ministry Wednesday cleared the much-awaited deal for the purchase of 83 Light Combat Aircraft (LCA) Mark 1A Tejas from the Hindustan Aeronautics Limited (HAL) for a surprisingly low amount of Rs 37,000 crore as against the original value of the deal, which was pegged at around Rs 50,000 crore.

These 83 jets will come with more enhanced capabilities than the earlier 40 Tejas ordered by the Indian Air Force (IAF). These enhanced capabilities include not just better weapon systems but also mid-air refueling and Active Electronically Scanned Array (AESA) radar.

This is the largest defence order placed by the Narendra Modi government under the 'Make in India' initiative.

"While orders of 40 Tejas aircraft had been placed with HAL in initial configurations, DAC (Defence Acquisition Council) paved the way for procurement of 83 of the more advanced Mark 1A version of the aircraft from HAL by finalising the contractual and other issues," according to a statement by the defence ministry.

"The proposal will now be placed for consideration of Cabinet Committee on Security (CCS). This procurement will be a major boost to 'Make in India' as the aircraft is indigenously designed, developed and manufactured with participation of several local vendors apart from HAL," the statement added.

The first LCA Mark 1A aircraft will be delivered to the IAF 36 months from the date of the contract.

ThePrint takes a look at how the Tejas Mark 1A will enhance the IAF's capabilities.

16 aircraft to be delivered every year

Defence sources told ThePrint if a contract is signed in the next three months, then the first flight of the Tejas Mark 1A will take place by the end of 2022 and the first squadron would be completed by 2024.

According to the plan, 16 aircraft are to be delivered every year.

"The relevant infrastructure has been put in place to ramp up the production to 16 aircraft per year. Once the contract is signed, work on procurement of supplies will start and the production will be geared up," HAL sources said.

Significant works on the jets have been outsourced by HAL to companies like Larsen and Toubro (L&T), Dynamatic Technologies and Alpha Design.

The wings will be manufactured by L&T, while front fuselage has been outsourced to Dynamatic Technologies and the middle section to VEM. The rear section of the fighter has been outsourced to Alpha Design.

Contract likely to be inked next fiscal year

Defence sources said the actual contract for the Mark 1A Tejas is likely to be signed only in next fiscal year, starting 1 April.

This, sources said, was because the process of CCS clearance will take time and the fund allocation would be done through the new budget, which comes into effect from 1 April.

While initially the IAF wanted major capability enhancement in the Tejas and was looking at a significantly different aircraft LCA Mark 2, the Aeronautical Development Agency (ADA), the DRDO and HAL proposed the LCA Mark 1A in 2015.

So while the ADA focuses on the Tejas Mark 2, which falls in the category of a medium weight fighter, the IAF will induct the Mark 1A Tejas to deal with a depleting squadron strength.

The current squadron strength stands at 30 as against the sanctioned strength of 42.

Better equipped

The 83 Tejas Mark 1A will be significantly better than the 40 Tejas Mark 1 that the IAF has ordered. They are already in the process of being manufactured and inducted into the IAF.

The significant difference between Mark 1 and Mark 1A Tejas is that the latter will be equipped with the Israeli Active Electronically Scanned Array (AESA) radar instead of the manually-scanned Elta EL/M 2032 radar, also Israeli.

While work is in progress on an indigenous AESA radar, Uttam, which is currently undergoing trials, the initial lot of the Tejas Mark 1A will come equipped with the Israeli technology.

The new Tejas will also have a Self-Protection Jammer (SPJ) on a pod under the wing.

Two other upgrades include improving the “maintainability” of the fighter and equipping it with external refuelling capability to allow it to cover a longer distance.

The Mark 1A will also be able to fire a variety of Beyond Visual Range (BVR) missiles and close combat air-to-air missiles. Sources also said the jets will be equipped with Vympel R-73 CCMs and a Derby BVR missile.

Efforts are also on to integrate the Brahmos NG with the jets.

Why the fall in price

The big fall in price from an estimated Rs 50,000 crore to just about Rs 37,000 crore is a direct result of a juggling exercise by the IAF, which cut down on its demand list, including spares, logistics support and other issues.

Also, the HAL was directed to cut down its earlier projected profit of 12 per cent to a little over 6 per cent.

These efforts led to a decrease in the price at a time the military is facing a huge budget challenge amid cash crunch.

<https://theprint.in/theprint-essential/hal-cuts-its-profit-on-tejas-mark-1a-deal-by-50-fighter-jets-to-take-to-sky-by-2022/383730/>



Fri, 20 March 2020

Make in India: OFB, DRDO to develop fully indigenous Futuristic Infantry Combat Vehicle in 3-5 years

Tentatively named Mark I, the vehicle will help modernise Indian Army's infantry frontier which currently relies on BMP II, an infantry personnel carrier with a 30 mm gun

By: Yash Shukla

New Delhi: Make in India boost for Indian Army: A fully indigenous Futuristic Infantry Combat Vehicle (FICV) is being developed by Ordnance Factory Board (OFB) and Defence Research Development Organisation (DRDO) for the use of the Indian Army. Tentatively named Mark I, the

vehicle will help modernise Indian Army's infantry frontier which currently relies on BMP II, an infantry personnel carrier with a 30 mm gun. The joint collaboration between the Ordnance Factory Board and the DRDO will yield results in a period of three to five years, PTI reported.

Advanced features which were at the drawing board stage will now be included in the FICV, OFB chairman Hari Mohan was quoted as saying. He also said that DRDO and OFB, which were earlier working separately on the project, decided to join forces to develop the project. Mohan further said that the specifications and features of the project will keep advancing as it is an evolving project. When the project attains a satisfactory stage in tune with the feedback of Indian Army officials, the factory will begin production of the infantry vehicle, he said.

Terming the name of the infantry vehicle tentative, Mohan said that Mark I will be ready in 3-5 years whereas its sequel Mark II can take up to a decade in its development. In accordance with the Make in India initiative of the Modi government, most of the parts to be used in the production will be developed in India barring some minor sub-systems, Mohan informed.

With enhanced firepower, the vehicle will boast of an auto-grenade launcher with a range of 1,500 metres, an OFB official was quoted as saying in the report. It will also include an anti-tank guided missile capability which can fire missiles within a range of 4000 metres with automatic command, the official added. A gun control system linked with a thermal imager fire control is another big ticket feature that makes the FICV highly advanced, the official said.

Upbeat with an increase in defence exports in recent years, OFB has set a target of exports worth Rs 500 crore a year in the next two to three years. OFB exported products worth Rs 240 crore last year in comparison to Rs 15-20 crore mark it registered in the preceding years, the OFB chairman said.

<https://www.financialexpress.com/defence/make-in-india-ofb-drdo-to-develop-fully-indigenous-futuristic-infantry-control-vehicle-in-3-5-years/1901907/>



Fri, 20 March 2020

IAF to buy aerial fuses and twin-dome simulators for Hawk Mk32

The Defence Acquisition Council (DAC) has given approval to procure equipment for the Indian Air Force's (IAF) Hawk Mk32 jet trainer aircraft.

The locally made defence equipment will cost Rs13bn (\$174.5m) and includes aerial fuses and twin-dome simulators for the aircraft.

The Indian Ministry of Defence (MoD) said in a statement: "The DAC has accorded approval for acquisition of indigenous defence equipment for about Rs1,300 crore (\$174m).

"The proposals were for procurement of Aerial Fuses and Twin-Dome Simulators for Hawk Mk32 aircraft for the IAF."

In addition, the DAC has cleared the proposed procurement of 83 advanced Mk1A version of Tejas aircraft for the IAF. The contractual details have also been finalised.

The light combat aircraft (LCA) Tejas supersonic combat fighter is designed by Aircraft Development Agency (ADA) under the Defence Research and Development Organisation (DRDO).

Manufactured by Hindustan Aeronautics Limited (HAL), the procured equipment will be a significant capability boost for the IAF. HAL will also maintain the aircraft.

The proposal now awaits approval from Cabinet Committee on Security (CCS).

The MoD added: “This procurement will be a major boost to ‘Make in India’ as the aircraft is indigenously designed, developed and manufactured with participation of several local vendors apart from HAL.” The ministry noted that orders have been placed with HAL for 40 Tejas aircraft in initial configurations.

<https://www.airforce-technology.com/news/iaf-aerial-fuses-twin-dome-simulators-hawk-mk32/>



Fri, 20 March 2020

‘Our medical teams a call away’: CDS General Bipin Rawat

Coronavirus: Chief of Defence Staff General Bipin Rawat is part of the daily conferences convened by Union health minister Harsh Vardhan and Cabinet Secretary Rajiv Gauba

By Harinder Baweja

New Delhi: India’s Chief of Defence Staff (CDS), General Bipin Rawat, tasked to synergise the functioning of India’s three armed services, is now on top of a plan to deal with the coronavirus battle domestically and in the immediate neighbourhood.

“Our aircraft and doctors are one call away, and can be rushed to any country in the neighbourhood. Within the country, we have readied 10,000 beds for quarantine [in military facilities] and can also quickly set up isolation wards,” Rawat said in an exclusive interview.

The single-point military adviser to the government who is responsible for setting up critical tri-service theatre commands to enhance the country’s conventional warfare preparedness is now part of daily meetings on tackling Covid-19, a disease that has infected 226,000 and killed over 9,250 around the world. In India, it has so far infected 173 (including some foreigners) and killed four.

Rawat is part of the daily conferences convened by Union health minister Harsh Vardhan and cabinet secretary Rajiv Gauba. “We have facilities and structures. The armed forces, be it the army, navy or the air force, have always lent their shoulder to disasters. We will be letting the nation down if we don’t step in,” he said.

All services have issued advisories to their rank and file on dealing with the disease, and Rawat said that he had advised the service chiefs to sanction more leaves. “Those already on leave in rural areas are being encouraged to extend their leaves,” the CDS said, adding that the disease is currently primarily being reported from metros and large cities.

In Leh, where an army soldier tested positive for Covid-19, commanders have been told to allow leaves beyond the sanctioned 25% (of strength) mark.

The services have already halted all celebrations and training programmes. The army has asked its formations to avoid all non-essential mass gatherings, including festivals, welfare activities and public gatherings. It sent out an advisory on March 13 urging all military establishments to avoid gatherings because of the growing fear over the spread of coronavirus.

A list of service hospitals where patients can be isolated and treated have been shared with the government.

“Since we have stopped training programmes and are discouraging conferences and meeting, a lot of the work has slowed down. The same personnel will now help deal with the virus. Our preparedness will not suffer,” said Rawat, reiterating that India’s armed forces are “battle-ready” and can even respond to a call from a neighbouring country. “Our planes are ready and so are our doctors.”

<https://www.hindustantimes.com/india-news/our-medical-teams-a-call-away-cds-general-bipin-rawat/story-k7cIEQDkx7ESSthMB9yLKO.html>

COVID-19| Armed forces set up eleven new quarantine facilities

New Delhi: With coronavirus continuing to spread across the country, the armed forces have set up 11 additional quarantine facilities, in addition to the four presently in operation, the Defence Ministry said. These facilities can be made operational in 24 to 48 hours.

“There are four such facilities in operation at the moment, at Manesar and Jaisalmer, run by the Army; at Mumbai run by the Navy and at the Hindon air base run by the Indian Air Force (IAF),” the Defence Ministry said in a statement. In addition, more quarantine facilities are being readied and may be made operational within 48-72 hours, if needed, it stated.

These facilities are at Jodhpur, Kolkata and Chennai by the Army, at Visakhapatnam and Kochi by the Navy and at Dundigal near Hyderabad, Bengaluru, Kanpur, Jaisalmer, Jorhat and Gorakhpur by the IAF.

The IAF had deployed C-17 Globemaster aircraft to evacuate a few hundred Indian nationals from COVID-19 affected countries and also some people from friendly countries like Maldives, Myanmar, Bangladesh, US, Madagascar, Sri Lanka, Nepal, South Africa and Peru. Several others were also brought in by Air India flights and quarantined at military facilities.

As per standard procedure, evacuated people are being kept under quarantine for a period of 14 days under the supervision of medical authorities. “The affected are also being provided with facilities to be in touch with their loved ones. Prophylactic measures are also being taken to prevent the spread of the contagion,” the statement added.

<https://www.thehindu.com/news/national/covid-19-armed-forces-set-up-eleven-new-quarantine-facilities/article31111081.ece>



Fri, 20 March 2020

Indian Army issues Coronavirus cyber scam alert to defence personnel

The Indian Army on Thursday issued a cyber scam alert over the deadly Coronavirus to the defence personnel. An official statement read, "Targeted campaigns on the theme of coronavirus are being undertaken by Indian adversaries with the primary aim of compromising email/ other accounts and to infect official/ personal IT assets of defence personnel."

"In these campaigns, various messages in the form of phishing E-mails, SMSes and WhatsApp messages related to coronavirus are being circulated to the environment. These messages are embedded with malicious attachments, links/ documents and appear to originate from a genuine-looking spoofed source," added the statement.

"Any such coronavirus themed message/ e-mail with or without attachments should not be opened and treated with due caution. Do not access such message/ e-mail and delete it immediately if received," further added the statement.

<https://zeenews.india.com/india/indian-army-issues-coronavirus-cyber-scram-alert-to-defence-personnel-2270494.html>

Defence Ministry places order for 16,479 LMG

New Delhi: The Ministry of Defence (MoD) on Thursday signed a ₹880-crore contract with the Israeli Weapon Industries (IWI) for 16,479 Light Machine Guns (LMG).

“The Acquisition Wing of MoD has signed the capital acquisition contract with Israel Weapons Industries for procurement of 16,479 LMGs at a cost of ₹880 crore with the approval of Defence Minister Rajnath Singh,” the Ministry said in a statement.

The contracted Negev 7.62X51 mm LMG is a combat-proven weapon and currently used by several countries and would greatly enhance the lethality and range of a soldier compared to the presently used weapon, it said.

The Army has recently begun inducting the first batch of 10,000 SIG-716 assault rifles with troops engaged in counter-insurgency operations in the Northern Command. The rifles are being procured under a contract signed in February 2019 with Sig Sauer of the U.S. for 72,400 SIG-716 assault rifles worth over ₹700 crore.

The Army is also close to signing the final deal for the procurement of over 7.5 lakh AK-203 assault rifles most of which would be manufactured locally by an India-Russia Joint Venture (JV) under technology transfer.

<https://www.thehindu.com/news/national/defence-ministry-places-order-for-16479-lmg/article31115082.ece>

*Fri, 20 March 2020*

Six months after theft at Cochin Shipyard, security tightened

With the deployment of additional personnel from the Central Industrial Security Force (CISF), the security at Cochin Shipyard, where India's first indigenous aircraft carrier – INS Vikrant – is under construction, has been tightened.

The development comes in the wake of theft onboard the vessel in September last year. Four computers were dismantled and hard disks, RAMs and processors were stolen.

The decision follows the recommendations of the Intelligence Bureau (IB) and the National Investigation Agency (NIA), which had taken up the case in September after many groups expressed concerns that the sensitive information stored in these hard disks may pose national security risks.

NIA had examined the fingerprints of over 1000 people with the assistance of Kerala Police, but have been unable to find any leads. Police sources are of the view that the incident could be the handiwork of an insider. NIA has also endorsed this view.

Details of Integrated Platform Management System (IPMS) – a computerised system used onboard ships to monitor the working and course of the vessel and to warn against safety risks – reportedly stored within the hard drives were also sought from Bharat Heavy Electricals Limited, the company which built it, and an Italian company which assisted it.

After the incident, biometric scanning and body scanning was made mandatory at the gates of the shipyard. While CCTV cameras were installed at the shipyard premises during the time of the incident,

surveillance sensors were not fitted onboard the under-construction aircraft carrier. This too has been rectified.

Both the Union Defence Ministry and the Indian Navy had downplayed the theft, noting that the aircraft carrier is not yet part of the services.

Forty-six security personnel will be stationed at Cochin Shipyard, the largest shipbuilding and maintenance facility in India, until the completion of the vessel, slated for sea trials in February 2021. Cochin Shipyard is under the purview of the CISF.

INS Vikrant is the first Indian indigenous aircraft carrier vessel of the Indian Navy designed and built in India. The work on the ship's design began in 1999, and the keel was laid in February 2009. As of 2019, the ship is expected to start sea trials in February 2021 and enter into service as early as 2023. The project cost has neared Rs 20,000 crores.

With the completion of INS Vikrant, India will join the ranks of US, England, Russia, France and China in the construction of flight carriers.

<https://www.defencenews.in/article/Six-months-after-theft-at-Cochin-Shipyard,-security-tightened-809791>

Business Standard

Fri, 20 March 2020

10 earth-observing satellites among 36 missions lined up by ISRO for FY21

Gaganyaan (unmanned) is also part of Isro's mission for 2020-21

By T E Narasimhan

The Indian Space Research Organisation (ISRO) lined up as many as 36 missions including ten earth observation satellites in 2020-21.

Union Minister of State for Atomic Energy and Space, Jitendra Singh said that besides 10 earth observation satellites, the space agency lined up three communication satellites, three space science satellite, two navigation satellite and one technology demonstration.

Gaganyaan (unmanned) is also part of Isro's mission for 2020-21.

As far as the rockets are concerned, ten PSLV launches, three GSLV MkII, one GSLV Mk III have been lined up. Two small satellite launch vehicle have also been lined up, said the Minister.

"Indian Space Programme is focused on the peaceful use of outer Space. Towards this end, space technology should be used for the benefit of the country and society, and should provide solutions for developmental activities," said the Minister.

ISRO has completed 11 missions so far this fiscal year. These include four eEarth observation satellites, one communication satellite and one space satellite. Four PSLV and one GSLV MkIII were completed in 2019-20.

https://www.business-standard.com/article/economy-policy/10-earth-observing-satellites-among-36-missions-lined-up-by-isro-for-fy21-120031901076_1.html

India prepares to launch its first crewed mission in 2021

The crew will travel to low Earth orbit for a week using homegrown technology — a first for India. Prior tests include a humanoid robot, three astronauts, and six scientific experiments

By Sharmila Kuthunur

On April 2, 1984, Indian Air Force (IAF) pilot Rakesh Sharma reached low Earth orbit aboard a Soviet rocket for a weeklong stay on the Salyut 7 space station. This made him the first and only Indian citizen to venture into space. Now, almost 36 years later, the country that was once dependent on the Soviets for getting into orbit is inching toward its very own human spaceflight program — one that aims to launch its first crewed flight, called Gaganyaan, in December 2021.

With a goal to demonstrate India's homegrown technology, for the first time in history the Indian Space Research Organisation (ISRO) will launch three astronauts into low Earth orbit for a minimum of one week. This will be a historic moment for India, retired ISRO scientist Kashyap Mankad explained to *Astronomy*, one that the country will long remember.

Off to a rocky start

ISRO's goal to send Indian astronauts into space is not entirely new. While NASA has launched hundreds of astronauts into space in recent decades, ISRO's most recent (unsuccessful) plan was in 1986. At the time, the organization had prepared to launch two payload specialists aboard one of NASA's space shuttles. But the *Challenger* disaster and NASA's subsequent pause in crewed flights brought ISRO's plans to a grinding halt. This led ISRO to redirect its funding toward indigenous launch vehicles, pushing its crewed missions to the sidelines.

The dormant dream of crewed flights resurfaced in 2006. The intermittent planning for the Gaganyaan mission began, but a lack of funding prevented significant progress. It was only after Indian Prime Minister Narendra Modi officially announced the mission in 2018 that ISRO received a 3 percent raise in its annual budget. This led to the creation of a short list of astronaut candidates, and real deadlines were established for both un-crewed and crewed spaceflights.

Sending a dummy to space

In preparation for the 2021 crewed mission, ISRO plans to conduct two un-crewed flights in December 2020 and July 2021. Instead of testing empty spacecraft, the ISRO will launch a humanoid robot named Vyommitra — Sanskrit for “space's friend” — into low Earth orbit, which will act as a dummy astronaut for the first two test flights. Unveiled by ISRO on January 22, 2020, Vyommitra is programmed to be receptive to its environment, mimic crew activities, and perform life-support operations, all of which will help in assessing issues with the astronauts' crew module before their 2021 flight.

“The major milestone towards a successful mission is to ensure that human life onboard is safe and sound. This calls for rigorous testing of various complex systems,” Shubhayu Sardar, lead systems developer at the Human Space Flight Centre who works on developing life support systems for Gaganyaan's astronauts, told *Astronomy*.

Although Vyommitra is legless, its body is equipped with communication systems that help it recognize and converse with astronauts. In addition to advancing technology, scientists think the data collected from these demo missions will help improve critical systems for the 2021 flight, heightening its odds at success.

For a country that has launched only communication satellites into low Earth orbit for the past 50 years, launching humans will require a giant step up from its current technology. While the GSLV MkIII— selected to fly both dummy and real astronauts — holds the title for India’s most powerful rocket, two of its three stages are scheduled for major upgrades in preparation for a crewed flight.

“The reliability targeted for human-rated launch vehicles is 0.99, which means statistically only 1 out of 100 can be unreliable,” S. Somanath, MkIII’s deputy project director, has said.

Once the crew module and its subsystems are ready, MkIII will blast off with astronauts and six scientific experiments from the Satish Dhawan Space Centre. The flight time to enter low Earth orbit is expected to be 16 minutes, after which the solar arrays will be deployed for one week. During its return, the crew module will separate from the service module and its engines, reenter Earth’s atmosphere, and deploy two parachutes that will slow it down for a gentle landing in the Arabian Sea.

A series of firsts

Although the pursuit of accomplishing crewed spaceflight is new for ISRO, the push toward unprecedented goals is not. The Mars Orbiter Mission, Chandrayaan-1 and -2, and 104 satellites launched at once are just a few of ISRO’s recent examples of missions that required entirely self-developed technologies. Though not every moonshot was a success — Chandrayaan-2 lost both its lander and rover when they crash-landed last year — they showed India’s ability to develop previously untried system designs and mission management strategies.

“History has shown us that most technical developments have taken place either during a war or in developing a space program,” says Mankad.

With the Gaganyaan mission, one such development is enabling astronauts to bathe during spaceflight using water spray technology. Applying subtle pressure on a simple water-fitted gun will enable astronauts to freshen up using the spray in an environment where water does not flow.

Given the current limitations of Indian spaceflight, Gaganyaan’s tight deadline of two years seems hard to accomplish, even with a \$1.4 billion budget. Test flights must be carried out, post-flight improvements must be made, and only then will astronauts be cleared to fly. But for comparison, NASA’s first human spaceflight program, Project Mercury, was initiated in October 1958 and saw its first crewed flight in May 1961. So although ISRO’s two-year goal for flight seems frightfully short, the timeline is not unheard of. Also, keep in mind that after the Mercury program’s first successful crewed flight, NASA launched five more crewed missions in the following two years.

In an attempt to adhere to these deadlines while saving precious time and money, ISRO is choosing to outsource some technological development to other Indian research institutions, but certain aspects of a crewed flight require international help. India may be manufacturing the staples like space food and components for launch vehicles, but the necessity of astronaut training is leading to partnerships with Russia and France.

International collaboration on a national mission

Despite ISRO’s goals of developing a fully indigenous human spaceflight program, the organization doesn’t have a lot of know-how about what it takes to be an astronaut. It’s one thing to make a machine that will work in orbit, but it’s something entirely different to keep a human alive and healthy in an environment as unforgiving as space.

“The challenges in engineering technologies will be relatively easier to deal with than human science challenges like space medicine, exposure to the space environment, and rehabilitation and adaptation to normal life [back on Earth],” explains Mankad.

ISRO’s inexperience with astronaut training has opened up opportunities for an international collaboration with Glavcosmos, a subsidiary and launch service provider of Russia’s space agency Roscosmos. And in January 2020, four IAF pilots-turned-astronauts were flown to the Yuri Gagarin Cosmonaut Training Center near Moscow to begin a 12-month training program. It will include intensive physical and biomedical training, study of the Soyuz systems, and preparation for unusual

flight conditions. Additionally, ISRO is teaming up with France to train IAF doctor to monitor the health of astronauts before, during, and after their flights.

The road ahead

If the mission is successful, India will join the ranks of China, the U.S. and Russia in launching their own crews into space. Gaganyaan's astronauts — the first batch of ISRO's human spaceflight program — will conduct scientific experiments in microgravity that cover a spectrum of research topics, ranging from space medicine to communication technology. And as we've seen from other national space agencies in the past, after ISRO completes a number of crewed flights and experiments, an Indian space station might be in the offing.

While similar to the International Space Station (ISS) in structure and objectives, the theorized Indian space station will weigh only 20 tons and serve as a temporary home for astronauts to perform experiments. While ISRO has set the year 2030 as its target to launch a space station, the agency has not yet outlined how it will be built or what it might look like. The history of building functional, habitable space stations points toward at least a decade of careful planning before execution. Despite longer preparation timeframes, the first attempts by the Soviet Union and the U.S. ranged from imperfect launches to unfortunate deaths.

The ISS's foundations date to 1984, and its first module wasn't launched until 14 years later. The ISS reflects the efforts of five countries that took nearly a decade and 35 shuttle missions to assemble. Currently, ISRO's plans to launch its own space station seem ambitious, if not impossible. But the first step toward achieving this, Mankad says, is for ISRO to redirect its focus toward developing reusable lower stages for its rockets. This could help minimize the astronomical costs that come with spaceflight.

"It is time ISRO thinks big and takes up more challenging tasks. Time to do this is now," he explains, adding that Indian research institutes will play a major role in shaping the future of ISRO's space program.

Additionally, ISRO missions to study the Sun, Moon, and Mars are lined up in the next five years, highlighting the agency's gradual shift from focusing on communication satellites to becoming a major player in exploring the solar system. With a targeted launch in late 2020, Chandrayaan-3 will be ISRO's second attempt to land a spacecraft on the lunar south pole. Also planned for launch this year is Aditya-L1, ISRO's first mission to study the Sun. A longer, ongoing project is Mars Orbiter Mission 2, a successor to the 2014 mission that brought ISRO to the limelight because of its cost-effective and successful method of putting a spacecraft into martian orbit on its first attempt.

With launch dates planned for the next few years, these missions come at a patriotic time in Indian history: the country's 75th year of independence. The cultural significance attached to the Gaganyaan mission means the launches will undoubtedly be viewed by many, including the crowd at ISRO's first visitor's gallery. In an attempt to pique people's interest in space, the gallery — which is almost always overridden even though it can accommodate some 5,000 visitors — is one of many outreach efforts recently taken up by ISRO since the inception of its human spaceflight program.

Through these missions and activities, ISRO is not only accomplishing a series of firsts and making great strides to returning Indian astronauts to space, but it's also gradually carving out a reputation as a major player in spaceflight — one mission at a time.

<https://astronomy.com/news/2020/03/india-prepares-to-launch-its-first-crewed-mission-to-space-in-2021>

SpaceX plans 1st manned flight to space in May

Washington: Elon Musk's SpaceX will send astronauts to the International Space Station for the first time in May, NASA said, announcing the first crewed launch from the United States to the platform since 2011. The tech entrepreneur's company will launch a Falcon 9 rocket to transport NASA astronauts Bob Behnken and Doug Hurley in a first for the space agency as it looks to cut costs.

"NASA and SpaceX are currently targeting no earlier than mid-to-late May for launch," the US space agency said in a statement on Wednesday.

In March, Musk's Crew Dragon capsule made a round trip to the ISS, which is in orbit more than 400 kilometers above Earth, with a mannequin on board, before returning to the Atlantic after six days in space.

Since the last US space shuttle mission in 2011, after 30 years of service, only the Russians have been going back and forth to the ISS.

SpaceX has made the trip 15 times since 2012, but only to refuel the station.

It is not the only private company servicing NASA: Boeing has also won a contract and is developing its own Starliner capsule.

<https://timesofindia.indiatimes.com/home/science/spacex-plans-1st-manned-flight-to-space-in-may/articleshow/74723035.cms>