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DRDO, French company talks on Kaveri jet engine crash

DRDO found cost high; Safran struggling to fulfil its €580-million offsets obligation

By Manu Pubby

New Delhi: The plan to develop the indigenous Kaveri fighter jet engine as part of the Rafale offsets deal with the help of French technology is believed to have fallen through after the Indian side found the pricing prohibitive.

At least three people, who were part of the discussions, told ET that the project is now as good as over. The engine was supposed to power the indigenous Light Combat Aircraft (LCA) as well as future fighter jets.

The talks with French engine manufacturer Safran, which makes the engines and electronics for the Rafale fighters, seem to have hit a roadblock after it emerged in detailed studies that only a part of the offsets — just over €250 million — could be utilised for the project. Defence Research and Development Organisation would have had to provide the remaining €500 million, said sources.

ET has learnt that DRDO did not find this price reasonable and is no longer considering the upgraded Kaveri engine for the next batch of 83 LCAs to be made in India or the Mark2 version of the jet planned in the near future. The fighter jets are now likely to be powered by engines supplied by US' General Electric. DRDO has spent more than €240 million on the Kaveri project so far without success.

Four Years of Work Needed As per the Rafale contract, French companies have to invest 3.4 billion euros worth of offsets in India by 2023. Of these, Safran alone has to execute offsets in excess of 580 million euros. The company, sources said, is now struggling to fulfil its obligations.

Other firms undertaking offsets for the Rafale deal — Dassault, Thales and missile manufacturer MBDA — have already submitted detailed plans to execute their obligations and have commenced work with Indian partners.

Sources told ET that advanced talks on reviving the Kaveri engine took place between DRDO and the French manufacturer, which were followed by a detailed project assessment, which brought out that four years of work was needed to get the engine back on track.

As per the proposal being discussed, the Kaveri engine, which was more or less abandoned as a project in 2014 since it did not provide enough thrust for the fighter jets, was to be modified into a worldclass product with transfer of technology as well as manufacturing rights.

Engines are the most critical systems on fighter jets, and few nations have been able to master the technology to manufacture them. Rough estimates show that for a fleet of 200 LCAs in service, the cost of engines alone would be in excess of 25 billion euros over the lifecycle of the planes.

India has been struggling to develop its own combat jet engine despite efforts stretching over two decades. Efforts are also on to develop a graded down 'Ghatak' version of the Kaveri engine for use in the unmanned aerial combat vehicle being developed by India.

<https://economictimes.indiatimes.com/news/defence/drdo-french-company-talks-on-kaveri-jet-engine-crash/articleshow/70684809.cms>

Stalled Project

As per plan, DRDO had to invest **€500 million** in the project and use **€250 m** of offsets money

Discussions to rope in more offsets money into the project did not work out; cost found too high

Kaveri not to power next batch of Light Combat Aircraft (LCA) fighters

Unclear how French engine manufacturer Safran will now meet offsets obligations

Future technologies must be propelled by power of today's youth: DRDO Chairman

By Anantha Krishnan M

Bengaluru: Military minds, aviators and scientists involved in research and development got a sleek preview of the advances in defence technologies at the Katre memorial annual lecture here on Wednesday.

Like a physics lecturer and showing traces of his mentor Dr Abdul Kalam's speaking style, Defence Research and Development Organisation (DRDO) chairman Dr Satheesh Reddy touched upon focus areas in defence that included aerospace, missiles, space technology, missile defence and weapons, sensors and artificial intelligence.

"Our R&D efforts to support the Light Combat Aircraft Tejas programme ensured that we have now achieved close to 100 per cent indigenous capabilities for all critical 4+ generation technologies," Dr Reddy said.

On the AMCA (Advanced Medium Combat Aircraft), Dr Reddy said technologies like pilot associate, advanced avionics, body conforming-shared aperture, serrated doors, IR paints and high-temperature radar absorbing paints for nozzles are being launched in India.

As reported by Onmanorama earlier, India has an ambitious plan to have the first flight of AMCA by 2025 and scientists are already working on various stealth features for this platform.

Super cruise abilities to fly at supersonic speeds minus the afterburner, passive sensors, internal weapon bay, advanced integrated avionics, next-gen AESA (Active Electronically Scanned Array) radar, 360 degree enhanced situation awareness, IVHM (Integrated Vehicle Monitoring System), serpentine air intake,IRST (Infra Red Search and Track), MAWS (Missile Approach Warning System) and Diverterless Supersonic Intake (DSI) are among the new technologies that would get embedded on to AMCA.

He said on the Unmanned Combat Air Vehicle (UCAV) front India will use the derivative of Kaveri engine. "We have currently the Rustom-II being flight-tested. It has to increase its endurance other features as being mandated by the users. This would give us the confidence to develop UCAVs for which work has already begun. Features like precision strike by scene-matching, ground-control designation are being looked at now," he said.

The UCAV will have to operate at high altitudes (40000 feet) and possess long endurance in addition to having stealth features.

Swarm drones

The DRDO chief also touched upon 'swarm drones,' a capability advanced nations are already developing for future warfare. He said swarm drones can be used for search and rescue, search and destroy, autonomous surveillance, plume tracking and convoy protection.

On the recent success of A-SAT (Mission Shakthi), Dr Reddy said close to 50 industries had participated in this topsecret project, supplying close to 2000 components.

He said A-SAT missions are not repeated by any nations and India has achieved all the desired objectives.

Directed Energy Weapons

Touching upon new thrust area of Directed Energy Weapons (DEW), Dr Reddy said India has begun work on this field as well.

“We have begun the R&D of 50 kW DEW, including ship motion compensation. The laser propagation studies for long range (10 km) is on, including lethality study for various target materials. The bigger goal of development of a 100 kW system in future also has taken wing,” says the DRDO chief, who completes one year in office at the end of this month.

He said the AESA (Active Electronically Scanned Array) radar is currently undergoing trials.

“We had displayed our AESA radar fitted on Tejas during Aero India 2019. It is currently undergoing flight trials and we will complete it by end of this year. The results are extremely satisfactory. These are capable of detection, tracking, imaging and navigation,” Dr Reddy said.

Speaking to Onmanorama, Dr Reddy said in the last one year he has been putting the best foot forward to make DRDO a ‘delivering force.’

“We have a clear roadmap in place and our efforts are to deliver what the Services need on time. Greater emphasis has been given on quality and we have separately dealt with all the grey areas of the past. DRDO has a great role play in the government’s Make in India initiative. And, we are it, ” Dr Reddy said.

Smart innovations

On morphing technologies, he said scientists are already working on advance materials that adapt to external shape considerably to match the mission requirements during flight.

“Future missions require platforms with increased range, speed, less fuel consumption and long endurance. We also need higher stealth capability, reduced noise and minimal operational cost, ” he added.

He also touched upon new-age technologies in artificial intelligence (AI) and its application in military missions.

He said AI has tremendous potential in military applications such as warfare platforms, cyber-security, logistics and transportation, target recognition, battlefield healthcare, combat simulation and training, threat monitoring and situational awareness.

“At the end of it all, we need innovations that can secure our future. Innovations that can be smart, swift and sure. Technologies for tomorrow will have to be propelled by the power of today’s youth, ” Dr Reddy said.

Focus on youngsters

He said youngsters in DRDO have been given the freedom to come up with new ideas to aid ongoing and future missions.

“I am clear that the future of DRDO depends upon the kind of responsibilities and risk-taking abilities youngsters possess now. We have initiated a series of steps to give young scientists responsibilities in critical areas. I am inspired to see the kind of responses from youngsters, ” Dr Reddy said.

He said DRDO has come out with a scholarship scheme for girls who are keen to pursue a career in aerospace engineering, aeronautical engineering, space engineering, rocketry, avionics and aircraft engineering.

“The details are on our website. Girls studying in first year of B.Tech\BE or M.Tech\ME are eligible for this scholarship,” Dr Reddy added.

As per the notification, selected PG students (girls) will get a scholarship of Rs 1,86,000 every year and Rs 1,20,000 per year for selected graduate candidates. The last date to apply for the scholarship is September 10, 2019.

(The writer is an independent aerospace and defence journalist, who blogs at Tarmak007 and tweets @writetake.)

<https://english.manoramaonline.com/news/nation/2019/08/15/drdo-chief-amca-india-defence-advancements.html>

Chief of Defence Staff will make defence forces more effective: PM Modi

The creation of the CDS will eventually lead to the formation of tri-service theatre commands intended to create vertical integration of the three forces

By Dinakar Peri

New Delhi: In a major decision for higher level military reforms and tri-service integration, Prime Minister Narendra Modi on Thursday announced the appointment of a Chief of Defence Staff (CDS) who will be above the three Service Chiefs. The modalities are expected to be finalised in the next few months, defence sources said.

“I announce that there will be a Chief of Defence Staff going into the future who would be above the three service chiefs. This is going to make the forces even more effective,” he announced in his Independence Day speech from the Red Fort. The creation of the CDS will eventually lead to the formation of tri-service theatre commands intended to create vertical integration of the three forces. However, it is not clear from the announcement if the CDS will be a four-star or a five-star officer.

The CDS will be a single-point military adviser to the government and synergise long term planning, procurements, training and logistics of the three Services. This is expected to save money by avoiding duplication between the Services, at a time of shrinking capital expenditure within the defence budget. “The Defence Ministry will constitute an implementation committee which will finalise the modalities which is expected to take few months,” a defence source said.

Given the time frame, Army Chief General Bipin Rawat could be the front runner to be the country’s first CDS as he has tenure till December 31 and would be the seniormost officer after Air Chief Marshal B.S. Dhanoa, also the current Chairman of COSC, who retires on September 30.

Kargil panel

The creation of a CDS to act as a single point military adviser to the Prime Minister on strategic issues was one of the key recommendations of the Kargil review committee on higher military reforms after the 1999 conflict. Despite much deliberation, the issue did not make progress due to lack of consensus and apprehensions from Services. In 2012, the Naresh Chandra committee recommended the appointment of a Permanent Chairman of Chiefs of Staff Committee (COSC) as a midway to allay apprehensions over the CDS. Currently, the seniormost of the three Chiefs functions as the Chairman of the COSC but it is an additional role and the tenures have been very short.

99 recommendations

The CDS is also one of the 99 recommendations made by the Lt. General D.B. Shekatkar (retd.) Committee which submitted its report in December 2016 and had 34 recommendations pertaining to tri-service integration.

Speaking to *The Hindu* on the announcement, Lt. Gen. Shekatkar said that with the fast changing security and defence environment this is the right moment for India to have a CDS. He said that during the Kargil conflict if India had a CDS it would not have suffered so many casualties in the initial stages as the Indian Air Force took time to come for support and “so it was felt there is need for a central point authority who can advise the government.”

He further added, “There are three different agencies buying the same thing. You are wasting the resources. The accounting systems are different. All these have been looked into by the committee and recommended a CDS.”

Military diplomacy

Another aspect Lt. Gen. Shekatkar stressed was the growing importance of military diplomacy in India's strategic engagements. "Military diplomacy is today supporting the conventional diplomacy. That can't be done by different Services. Each Service can't play a different role," he added.

Positive impact

"The announcement of the institution of CDS by Prime Minister Modi has been made keeping in view of the much needed reform to streamline and further improve the coordination among the three forces and their functioning. CDS will have a long lasting and a positive impact on India's security," Defence Minister Rajnath Singh said in a post on Twitter.

The issues of the single point military adviser and the creation of theatre commands have been on the agenda of the government in the previous term as well. This was emphasised by Mr. Modi during a discussion with the Combined Commanders Conference at Dehradun in 2017.

A pointer to the impending announcement was made by Mr. Modi in his speech on Kargil Vijay Diwas last month where he stressed on "jointness" and said it was time to connect among three Services in terms of "action and system."

<https://www.thehindu.com/news/national/pm-modi-announces-creation-of-chief-of-defence-staff/article29098991.ece>



Thu, 15 Aug 2019

Wing Commander Abhinandan to be awarded Vir Chakra

*He was caught by Pakistan after his MiG-21 went down across the
LoC on February 27 last and later handed over to India on March 1*

New Delhi: Indian Air Force (IAF) personnel who were part of the February 26 last Balakot air strike on a Jaish-e-Mohammad terror training camp in Pakistan and the air engagement a day after have been awarded gallantry medals on the eve of Independence Day.

Wing Commander Abhinandan Varthaman, who was caught by Pakistan after his MiG-21 Bison fighter jet went down across the Line of Control (LoC) on February 27 and was returned three days later, has been awarded Vir Chakra (VrC), the country's third-highest gallantry award.

During a dogfight with Pakistan Air Force jets on February 27, he shot down a Pakistani F-16 but his jet was shot down soon after. He was handed over by Pakistan to India at the Wagah-Attari border crossing on March 1.

"President Ram Nath Kovind, who is also the Supreme Commander of the armed forces, has approved 132 awards to armed forces personnel and members of paramilitary forces," the Defence Ministry said in a statement on Wednesday. These include two Kirti Chakras, one Vir Chakra, 14 Shaurya Chakras, 98 Sena Medals (Gallantry), five Nao Sena Medals (Gallantry), seven Vayu Sena Medals (Gallantry) and five Yudh Seva Medals.

Kirti Chakra, the second-highest peacetime gallantry award was posthumously awarded to Sapper Prakash Jadhav for his role in counter-insurgency operations in Kashmir. The Army also got eight Shaurya Chakras, 98 Sena Medals (Gallantry) and four Mention-in-Dispatches.

In addition to the VrC, the IAF got five Yudh Seva Medals and seven Vayu Sena Medals (Gallantry). Of the 13 awardees of the IAF, 12 are fighter pilots and one is lady officer Sqn. Ldr. Minty Agarwal, a flight controller on the ground. These included the five Mirage-2000 pilots who took

part in the Balakot air strike, defence sources said. Sqn Ldr Agarwal has been awarded the Yudh Seva Medal for directing the IAF fighters during the aerial engagement when Pakistani fighter jets attempted to bomb Indian military installations on February 27, the sources added.

Of the six gallantry awards to the Navy, most of them went for counter-insurgency operations in Jammu and Kashmir under 'Op Rakshak'. Four Mention-in-Despatches have also been approved to Army Personnel for different military operations, including one posthumously for 'Operation Anantnag Town'.

In addition, the President has also awarded one President's Tatrakshak Medal (Distinguished Service), five Tatrakshak Medals (Gallantry) and two Tatrakshak Medal (Meritorious Service) to personnel of the Indian Coast Guard for acts of conspicuous gallantry and distinguished/ meritorious service.

<https://www.thehindu.com/news/national/wg-cdr-abhinandan-varthaman-to-be-conferred-vir-chakra/article29090657.ece>

THE ASIAN AGE

Thu, 15 Aug 2019

Chandrayaan heads for moon's orbit

A passive experiment from US space agency Nasa will also be carried onboard Chandrayaan-2, the scientists added

By B R Srikanth

Bengaluru: Chandrayaan-2, India's second lunar probe, is a mere six days away from arriving at the moon's threshold.

On Wednesday, the orbiter-lander-rover mission moved away from the earth and onto the "Lunar Transfer Trajectory", and is expected to reach the moon next Tuesday, followed by a soft-landing of the earth's natural satellite on September 7. The critical commands for Wednesday's shift away from the earth were beamed from Isro's Telemetry Tracking and Command Network Station (ISTRAC) here. "Since its launch on July 22 all systems onboard Chandrayaan-2 spacecraft are performing normally", Isro said.

Earlier, the lunar probe's orbit was enhanced five times beginning with one operation a day after its launch on July 22 from Satish Dhawan Space Centre (SDSC) at the Sriharikota Range.

On August 20, Chandrayaan-2 will be nudged into its orbit around the moon through firing of the spacecraft's liquid engine. The orbit will be tweaked further gradually on August 21, 28, 30 and September 1 to help the probe inch closer to the moon. On September 2, "Vikram", the lander, carrying "Pragyan", the rover, will separate from the orbiter and move on another trajectory around the moon before Indian space scientists endure "15 terrifying minutes", as described by Isro chairman K Sivan, as the lander and rover will commence a powered descent to attempt a soft landing in the moon's south pole region. If successful, the Indian space agency will join an exclusive group of nations —Russia, the United States and China — to land on the moon.

Isro scientists said soon after the soft-landing, rover "Pragyan" will rollout from lander "Vikram" and carry out experiments on the lunar surface for a period of one lunar day, which is equal to 14 earth days. The orbiter carries eight scientific instruments to map the lunar surface and study the exosphere (outer atmosphere) of the moon while the lander carries three scientific payloads to conduct surface and subsurface science experiments.

The rover carries two payloads to enhance the understanding of the lunar surface. A passive experiment from US space agency Nasa will also be carried onboard Chandrayaan-2, the scientists added.

On the science front, Chandrayaan-2 intends to expand the understanding about the moon through a detailed study of its topography, mineralogy, surface chemical composition, thermo-physical characteristics and atmosphere, leading to a better understanding of the origin and evolution of the solar system.

<https://asianage.com/india/all-india/150819/chandrayaan-heads-for-moons-orbit.html>



Thu, 15 Aug 2019

NASA tests new Mars rover on Iceland's lava field

Utilising its sensors and camera, the rover gathers and classifies data from its environment

To prepare for the next mission to Mars in 2020, NASA has taken to the lava fields of Iceland to get its new robotic space explorer ready for the job.

With its black basalt sand, wind-swept dunes and craggy peaks, the Lambahraun lava field at the foot of Iceland's second biggest glacier, Langjokull, was chosen as a stand-in for the Red Planet's surface. For three weeks, 15 scientists and engineers sent by the U.S. space agency descended on the site, 100 kilometres from the capital, Reykjavik, last month to develop a prototype.

Experts say that Iceland, a volcanic island in the middle of the North Atlantic, is in many ways reminiscent of Mars.

"It's a very good analogue for Mars exploration and learning how to drive Mars rovers," said Adam Deslauriers, manager of space and education, at Canada's Mission Control Space Services. The company has been commissioned by NASA to test a rover prototype as part of the SAND-E (Semi-Autonomous Navigation for Detrital Environments) project.

'Indestructible'

The prototype is a small, electric vehicle with white panels and an orange chassis. It has a four-wheel drive propelled by two motors and is powered by 12 small car batteries stacked inside.

"This rover we have... (is) basically indestructible," Deslauriers told *AFP*. "The rovers that we have on Mars and the Moon would be a lot more sensitive to the environment and conditions of Iceland. A Moon rover is completely unprepared for rain," he added, just as a rain shower swept in.

Equipped with sensors, a computer, a dual-lens camera and controlled remotely, the rover moves its approximately 570 kilograms at a leisurely speed of about 20 centimetres per second.

The speed needs to be slow to enable the rover to collect data and imagery properly, Mark Vandermeulen, a robotics engineer at Mission Control Space Services, said. The meagre pace on the lava field is still two to four times faster than the speed it will be driving at its extraterrestrial destination.

Transmitting from Mars to Earth

Utilising its sensors and camera, the rover gathers and classifies data from its environment and sends back the findings to the engineers' trailer. The engineers then package the data and forward it to a tent where the scientists are huddled, to simulate how the data would be sent from Mars to Earth.

The rover exploring Iceland is just a prototype for the one that will be going to Mars next year. That one, which has yet to be named, will also be able to collect samples and store them in tubes to be brought back to Earth by future missions.

As the prototype isn't capable of doing this, researchers walk to the area studied, armed with radiometers and other equipment, to collect all the data samples that the finished rover would be able to do.

'Similar to Mars'

The sites are selected to study how the chemical composition and physical properties of the sand and rocks change as they move from the glacier to a nearby river.

Before Mars became an inhospitable frozen desert with an average temperature of minus 63 degrees C, scientists believe that the planet shared many of the characteristics of the subarctic island.

"The mineralogy in Iceland is very similar to what we would find on Mars," Ryan Ewing, associate professor of geology at Texas A&M University, said. In particular, Ewing referred to minerals such as olivine and pyroxenes, both dark so-called mafic rocks, which have also been found on Mars.

"In addition to that, we don't have much vegetation, it's cold and we have some of the environments like sand dunes and rivers and glaciers that Mars has evidence of in the past," Ewing said.

Iceland has previously been used as a training ground for NASA missions.

During the Apollo mission years, 32 astronauts in the mid-1960s received geological training in the Askja lava fields and near the Krafla crater in the north of the country. The setting allows NASA to test equipment and procedures, as well as the people performing them, in extreme environments while remaining on terra firma. Mission Control says it is planning to return to Iceland next summer before the launch of the next Mars rover mission, scheduled between July 17 and August 5, 2020.

<https://www.thehindu.com/sci-tech/science/watch-nasa-tests-new-mars-rover-on-icelands-lava-field/article29091323.ece>