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Apollo Micro Systems Selected by IAF for Indigenous Precision Range Extension Kit (IPREK)

- In a major boost to India's indigenous defence manufacturing programme, Apollo Micro Systems (AMS) has been shortlisted by the Indian Air Force (IAF) as a key development partner for the Indigenous Precision Range Extension Kit (IPREK). The project aims to convert conventional unguided bombs into long-range precision-guided weapons, significantly enhancing the Indian Air Force's strike capability while reducing dependence on imported systems.
- What is IPREK?
- The Indigenous Precision Range Extension Kit (IPREK) is a bolt-on guidance and glide kit that can be attached to India's existing inventory of 500 kg General Purpose (GP) bombs. Once integrated, the kit transforms these unguided bombs into precision-guided glide weapons capable of striking targets from a much greater distance.
- The project has been sanctioned under the Make-II category of the Defence Acquisition Procedure (DAP) 2020, which encourages Indian companies to develop defence equipment using their own resources before induction by the armed forces.
- Key Features
- The IPREK system incorporates several advanced indigenous technologies, including:
- NavIC (Indian Regional Navigation Satellite System) for accurate navigation.
- Electro-Optical (EO) and Infrared (IIR) seekers for day and night precision targeting.
- Digital Scene Matching Area Correlation (DSMAC) guidance for operations even in GPS-denied environments.
- The upgraded weapon is expected to achieve an engagement range of 80–100 km while maintaining an accuracy of approximately 3 metres from the intended

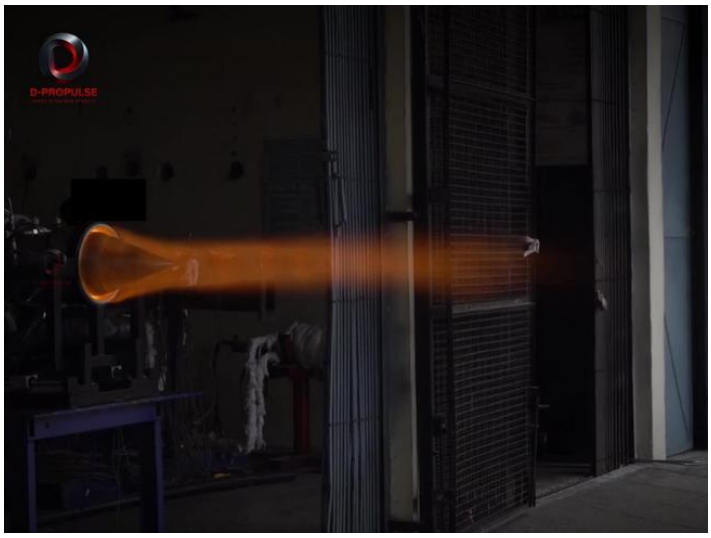
target. This allows combat aircraft to release weapons from outside the engagement envelope of many enemy air defence systems.

- Initial Procurement
- The Indian Air Force plans to procure more than 500 IPREK units in the initial phase. The programme is expected to provide a cost-effective solution by upgrading existing bomb inventories instead of purchasing entirely new precision-guided munitions.
- Significance
- The selection of Apollo Micro Systems reflects India's growing confidence in indigenous defence industries. The programme supports the government's Aatmanirbhar Bharat initiative by promoting domestic technology development, reducing import dependence, and enhancing the operational effectiveness of the Indian Air Force.
- Key Points
- Company: Apollo Micro Systems (AMS)
- Programme: Indigenous Precision Range Extension Kit (IPREK)
- User: Indian Air Force
- Category: Make-II under DAP 2020
- Range: 80–100 km
- Accuracy: Around 3 metres
- Navigation: NavIC-based guidance
- Initial Procurement: More than 500 units

India's First Indigenous 5 kN Air-Breathing Rotating Detonation Engine

- Indian defence startup D-Propulse has achieved a major milestone in aerospace technology by successfully demonstrating the country's first indigenously developed 5 kN air-breathing Rotating Detonation Engine (RDE) integrated with an aerospike nozzle. The achievement represents a significant advancement in India's indigenous propulsion capabilities for future aerospace and defence applications.
- What is a Rotating Detonation Engine?
- A Rotating Detonation Engine (RDE) is an advanced propulsion system that generates thrust using continuous rotating detonation waves instead of the conventional combustion process used in traditional jet engines. This approach enables more efficient energy release, potentially resulting in:
- Higher fuel efficiency
- Greater thrust
- Reduced engine size and weight
- Improved overall propulsion performance
- The demonstrated engine is integrated with an aerospike nozzle, a design that maintains high efficiency across a wide range of altitudes by automatically adapting to changing atmospheric pressure.
- Demonstration Highlights
- The indigenous engine successfully produced 5 kilonewtons (kN) of thrust, marking an important step in the development of next-generation propulsion technologies in India.
- According to the company, the successful demonstration validates the engine's performance in a relevant testing environment and highlights the potential of indigenous research and innovation in advanced aerospace systems.
- Potential Applications
- The technology has potential applications in several future aerospace platforms, including:
- High-speed unmanned aerial vehicles (UAVs)
- Advanced cruise missiles
- Next-generation aerospace propulsion systems
- Experimental high-speed aircraft

- Further development and testing will be required before operational deployment, but the demonstration represents an important technological milestone for India's indigenous defence ecosystem.
- Significance
- The successful demonstration positions India among the small group of countries actively developing advanced air-breathing detonation propulsion technology. It also strengthens the country's indigenous research capabilities and supports long-term efforts to achieve self-reliance in advanced aerospace propulsion.
- Key Points
- Company: D-Propulse
- Technology: Air-breathing Rotating Detonation Engine (RDE)
- Thrust: 5 kN
- Special Feature: Aerospike nozzle
- Achievement: First indigenous demonstration of its kind in India
- Potential Uses: UAVs, cruise missiles, and future aerospace platforms
- Significance: Boost to India's indigenous propulsion and defence technology ecosystem.



Policy Reforms For ICG

- Raksha Mantri Shri Rajnath Singh has unveiled two significant policy reforms for the ICG aimed at promoting gender parity in the induction & service conditions of officers and streamlining the administrative procedures for granting ex-gratia to the families of personnel reported missing at sea while on duty.

- Lauding the ICG for its exemplary service over the past five decades, Raksha Mantri exuded confidence that these forward-looking policies will further strengthen the morale and operational efficacy of the force as it marches toward its Swarnim Jayanti (Golden Jubilee) in 2027.
- He reaffirmed Prime Minister Narendra Modi-led Government's resolve to strengthen the ICG as a modern, capable and future-ready maritime force.
- Gender- Neutral Induction & Career Progression
- The first policy directive establishes a comprehensive, women-centric approach by ushering in a gender-neutral framework for the induction of officers into the ICG.
- The highlights of the policy include induction of women candidates into both Short Service Appointments (SSA) and Permanent Appointments (PA) at par with their male counterparts. SSA has also been opened for male candidates.
- The policy ensures equal opportunities for career progression, commencing right from the ab-initio training phase. The existing PA women officers shall also be considered for promotion to higher positions subject to fulfilment of eligibility conditions.
- Streamlined ex-gratia procedures for personnel missing at sea
- The second policy reform brings relief and administrative ease to the Next of Kin (NoK) of the personnel who unfortunately go missing at sea in the line of duty.
- The key highlights of the policy include the authority to declare ICG personnel missing at sea while on duty as 'presumed dead' for the purpose of ex-gratia.

India Says 'No' To New Su-30S As Su-57

- India has formally ruled out new Su-30MKI variants, redirecting resources to a sweeping modernisation of its existing fleet while simultaneously advancing negotiations on the Russian Su-57 stealth fighter.

- New Delhi chose to modernize the Su-30MKI instead of developing new versions. The question of the future of the fifth-generation fighter remains open for now.
- This marks a decisive shift in Indian airpower planning, balancing upgrades to proven assets with preparations for fifth-generation capabilities.
- India's Defence Minister announced that no new derivative versions of the **Su-30MKI** will be pursued. Instead, the emphasis will be on enhancing the current fleet of approximately **260 aircraft**.
- These fighters, originally adapted from the Russian Su-30 platform to meet Indian requirements, will undergo deep upgrades in control systems, avionics, electronic warfare suites, and weapons integration.
- Reports indicate that the first phase will target 84 aircraft, with deliveries expected between 2028 and 2030, before expanding to nearly 200 fighters.
- The centrepiece of the upgrade is the domestically developed Virupaksha AESA radar, capable of detecting stealth targets at 210 kilometres. This radar, lighter and more powerful than its predecessors, represents a significant leap in indigenous capability.
- These upgrades will extend the operational lifespan of the Su-30MKI fleet by decades, ensuring relevance against advanced regional threats such as China's J-20 and Pakistan's J-10C.India Geopolitical Analysis

Indian Army and IIT Jammu Sign MoU

- In a pivotal move aimed at enhancing India's self-sufficiency in defense technology, the Indian Army's Northern Command has entered into a strategic alliance with the Indian Institute of Technology (IIT) Jammu by signing a

Memorandum of Understanding (MoU). This partnership is designed to propel mission-oriented defense research and innovation, supporting the government's Atmanirbhar Bharat initiative.

- The MoU is set to meld the operational insights of the Indian Army with the academic prowess and research capabilities of IIT Jammu, tackling specific challenges faced by the Armed Forces with cutting-edge solutions. The initiative is poised to foster closer collaboration among military personnel, researchers, and academic institutions, thereby bolstering the technological self-reliance of India's defense sector.

- The signing ceremony was attended by notable figures including Lieutenant General Pratik Sharma, the General Officer Commanding-in-Chief of Northern Command, along with Lieutenant General P.K. Mishra from the White Knight Corps. Senior officials from IIT Jammu, including Director Professor Manoj Singh Gaur, Deans Professor Bacham Eswar Reddy and Professor Durai Prabhakaran, were also present, alongside senior Army officers, faculty, and students.

- This agreement came during NAVARAMBH'26, an inaugural foundation course for IIT Jammu's new academic session. Addressing the audience, Lieutenant General Sharma underscored the critical need for collaboration between the Armed Forces and academia to address emerging security challenges through technology-driven innovation. He urged researchers and students to engage actively with the military in developing practical solutions aimed at real-world operational problems.

- The General highlighted the fast-evolving nature of modern warfare, indicating that the future of defense capabilities hinges significantly on indigenous innovation and the integration of advanced technologies. The partnership is set to focus on mission-oriented research in specialized operational areas, creating indigenous systems that enhance operational efficacy while decreasing reliance on foreign technologies.

- Moreover, the collaboration provides students and researchers with the opportunity to contribute directly to national security through applied research. This aligns seamlessly with the Indian government's vision of an AtmaNirbhar Bharat that fosters self-reliance in defense manufacturing and technological advancement.

- For the Indian Army, particularly the Northern Command—responsible for safeguarding some of India's most strategically critical frontiers—leveraging innovative domestic technologies is vital for bolstering operational preparedness and capability. This collaboration with IIT Jammu is anticipated to expedite the development and implementation of solutions tailored to the unique challenges encountered in demanding operational contexts.

- The MoU signifies a crucial development in the increasingly synergistic relationship between India's Armed Forces and its higher education institutions. By integrating military expertise, scientific research, and academic knowledge, this partnership underlines a shared commitment to innovation, self-reliance, and capability enhancement, ultimately contributing to a more robust and technologically advanced national defense framework.

REVIEW QUESTIONS

1. Apollo Micro Systems has been shortlisted by the Indian Air Force for the development of which indigenous programme?

A) Akash-NG Programme
B) BrahMos-II Programme
C) Indigenous Precision Range Extension Kit (IPREK)
D) Astra Mk-III Programme

Answer: C) Indigenous Precision Range Extension Kit (IPREK)

2. The Indigenous Precision Range Extension Kit (IPREK) is being developed under which category of the Defence Acquisition Procedure (DAP) 2020?

A) Make-I
B) Buy (Indian-IDDM)
C) Strategic Partnership Model
D) Make-II

Answer: D) Make-II

3. Which Indian defence startup successfully demonstrated India's first indigenous 5 kN air-breathing Rotating Detonation Engine (RDE)?

A) ideaForge Technology
B) Solar Defence & Aerospace Ltd.
C) NewSpace Research & Technologies
D) D-Propulse

Answer: D) D-Propulse

4. The indigenous engine demonstrated by D-Propulse uses which advanced propulsion technology?

A) Scramjet Engine
B) Ramjet Engine
C) Turbojet Engine
D) Air-breathing Rotating Detonation Engine (RDE)

Answer: D) Air-breathing Rotating Detonation Engine (RDE)

5. The Government recently introduced gender-neutral recruitment reforms for which Indian maritime security force?

A) Indian Navy
B) Border Security Force (BSF)
C) Central Industrial Security Force (CISF)
D) Indian Coast Guard (ICG)

Answer: D) Indian Coast Guard (ICG)

6. Under the new Indian Coast Guard policy, women officers are now eligible for:

A) Only Short Service Appointment (SSA)
B) Only Permanent Appointment (PA)
C) Neither SSA nor PA
D) Both Short Service Appointment (SSA) and Permanent Appointment (PA)

Answer: D) Both Short Service Appointment (SSA) and Permanent Appointment (PA)

7. India has decided to strengthen its air power by modernising its existing fleet of:

A) MiG-29UPG
B) Rafale
C) Su-30MKI
D) Tejas Mk-1A

Answer: C) Su-30MKI

8. Which indigenous radar will serve as the centrepiece of the Su-30MKI upgrade programme?

A) Uttam AESA Radar
B) Ashwini Radar
C) Rohini Radar
D) Virupaksha AESA Radar

Answer: D) Virupaksha AESA Radar

9. Exercises B/w The India And UK Is Called:

A. Desert Eagle
B. SLINEX
C. Indra
D. Indradhanush

ANSWER: D

10. 'Nirdeshak' Ship Is built by

A. MDL
B. GRSE

C. CSL
D. DRDO
ANSWER: B

11. Netaji Subhash Chandra Bose Island Is Located At
A. A&N
B. Ladakh
C. J&K
D. Puducherry
ANSWER: A

12. V. O. Chidambaranar Port Trust Is Located In
A. T.N
B. M.H
C. Goa
D. A.P
ANSWER: A

13. Full-Form of ATAGS Is
A. Adventure Towed Artillery Gun System
B. Advanced To Artillery Gun System
C. Advanced Towed Artillery Gun System
D. Advanced Towed Artillery Gum System
ANSWER: C

14. At Which Of The Following Places Is The Heavy Vehicles Factory Located?
A. Kanpur
B. Khadki
C. Avadi
D. 24 Paraganas
ANSWER: C

15. Georgetown Is The Capital Of
A. Brunei
B. Qatar
C. UAE
D. Guyana
ANSWER: D

16. “Prashata Ranvirta” Is A Motto Of

A. Jammu And Kashmir Rifles
B. Gorkha Regiment
C. Punjab Regiment
D. None

ANSWER: A

17. Exercises B/w India And Bangladesh Is Called:

A. GARUDA SHAKTI
B. SLINEX
C. SAMPRITI
D. Yudha Abhyas

ANSWER: C

18. Barrett M95 Is A

A. Sniper Rifles
B. Helicopter
C. ATAGS
D. ATGM

ANSWER: A

19. Astra Is A

A. Air-to-air Missile
B. Air-to-surface Missile
C. Air-to-sea Missile
D. None

ANSWER: A

20. Where Is The Hq Of The Southern Command of The IAF?

A. Kochi
B. Vishakhapatnam
C. Pune
D. Thiruvantpuram

ANSWER: D