

# ARMY DESIGN BUREAU



## COMPENDIUM PROBLEM DEFINITION STATEMENTS (VOLUME IV) 2019







सत्यमेव जयते

रक्षा मंत्री  
भारत  
MINISTER OF DEFENCE  
INDIA



### **MESSAGE**

The development of operational capability of Indian Army to meet contingences of future challenges requires a unison approach of government, defence industry and academic approach.

For a pragmatic modernization programme, we must harness our strong academia and the upcoming defence industrial base to create solutions which are fully indigenous and give us a decisive combat edge over the adversary.

Technology has a disruptive influence on outcomes and we need to constantly align ourselves with the evolution of new and niche technologies. In last two years of raising of the Army Design Bureau, the efforts of the defence industry, R&D Establishments and Academia have been synergized to identify most cost effective solutions for our contemporary challenges.

The fourth volume of Compendium of Problem Statements will facilitate in focusing the efforts of the Academia, Defence Industry and R&D Establishments towards developing advanced technologies for the Indian Army.

**'Jai Hind'**

Date: 31<sup>st</sup> Dec, 2018  
Place: New Delhi

**(Nirmala Sitharaman)**





## MESSAGE



Indian Army has been striving to stay abreast with technology. Towards this end we have been focussing on transformation of Indian Army through force modernization. Our efforts have been to harness the efforts of Academia, Industry and R&D institutes so as to create home grown eco system of defence technology development & production. Army Design Bureau (ADB) has evolved itself as an effective interface between the Army, Academia, Industry and R&D institutes. This seamless synergy of stake holders and facilitators has helped us towards making the 'Make in India' initiative a reality.

The previous three volumes of Problem Statements have been received well by the Academia and Industry. Out of 130 problem statements enunciated in them, solutions to 70 have been taken up under various projects. I am sanguine that the fourth volume of problem definitions being released today would further accelerate efforts of research towards realisation of indigenisation of defence systems.

'Jai Hind'

(Bipin Rawat)  
General



डा० अजय कुमार

सचिव

**Dr. Ajay Kumar**

Secretary



सत्यमेव जयते

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### MESSAGE

In recent years, India has taken series of reforms towards positioning itself as a manufacturer and exporter of military hardware. Under the Draft Defence Production Policy 2018, we have set an ambitious defence export target of USD 5 billion by 2025 and become one of the world's top five defence producers. We have been playing an active role to develop a robust defence industrial base in the country through various initiatives with stake holders such as Armed Forces, DPSUs, Indian Private Players and Foreign OEMs. Army Design Bureau has been one of the force multiplier to carry forward the Government of India initiative towards self-reliance & indigenisation of technology in defence sector.

The progress on previous three volumes of Problem Statements have been given greater impetus by progressing 70 problem statements under various projects. The projection of problem statements in the fourth Volume will further leverage the industry, academia and R&D establishment to work towards self-reliance in niche technology.

'Jai Hind'

  
(Dr. Ajay Kumar)

Secretary (Defence Production)

Place: New Delhi

Dated: 07<sup>th</sup> January, 2019



## MESSAGE



India is emerging as a new hub for defence production, with an increased thrust being given to self-reliance through the 'Make in India' initiative. The Indian Army is transforming into a contemporary force, by virtue of greater modernization, to meet complex future challenges.

Greater interaction of Army with Industry and Academia through the projection of problem statement and their solutions has brought about a better understanding of the Services requirements among the stakeholders. The Indian Industry's strategic involvement will not only help in realizing the indigenization plans of the Indian Army and other services, but its inherent capabilities can also contribute towards building modern and best-in-class weapon systems, strengthening our forces.

The compilation of the fourth volume of 'Problem Statements' by the Indian Army through the Army Design Bureau is a commendable effort to share its requirements with the academia and the defence industrial base for creating indigenous solutions. Also, for the startups, who have recently started making their presence felt in the Defence Arena, this compilation will provide a golden opportunity to them to contribute towards possible solutions to the problems stated.

The Society of Indian Defence Manufacturers (SIDM) is committed to supporting the 'Make in India' initiative in the Armed forces. I would like to thank the Indian Army for their initiatives and assure the industry's continued support in realizing their goals of achieving self-reliance.

'Jai Hind'

A handwritten signature in black ink that reads "Baba Kalyani". The signature is written in a cursive, flowing style.

Baba Kalyani  
President, SIDM



## MESSAGE



As India stands at the unique position as fastest growing economy and demographic dividend offering exceptional opportunities across economic and social segments, the Defence sector is abuzz with fresh initiatives and pursuits. The Government's Make-in-India initiative with focus on indigenizing Defence sector while addressing unprecedented modernization needs of Indian Armed Forces has enthused the private Defence ecosystem eager to offer innovative solutions and offerings towards these unprecedented opportunities. Regular and open interactions between the Indian Army, Industry and Academia as an outreach initiative has led to a better and closer understanding between the stakeholders with visible success stories in the making. I wish to convey my appreciation for the Army Design Bureau, in its efforts towards building synergy between academia, industry, DRDO and the Indian Army to address unique problems faced by our front line forces.

I congratulate the Indian Army for continuing in this pursuit and compiling the fourth volume of Compendium of Problem Statements. The industry and academia has put in untiring efforts to innovate and evolve solutions for the previous compendium of problems. We look forward that this would further catalyse efforts to indigenize the defence industry. On behalf of the Indian Industry and the Society of Indian Defence Manufacturers (SIDM), I would like to thank the Indian Army Leadership for unstinted trust in this initiative and affirm our commitment to serve and fulfill the objectives of these initiative by the Indian Army and Ministry of Defence.

'Jai Hind'

A handwritten signature in blue ink, appearing to read 'Patil', with a large, stylized initial 'P'.

Jayant D Patil  
Vice President, SIDM



## MESSAGE



The Indian defence sector has progressed significantly from development of large multidisciplinary platforms to indigenization of assemblies and components, the defence industry has shown the capability to address the full spectrum of R&D and manufacturing requirements of the Armed Forces. The Indian defence industry today is well poised to meet the self-reliance goals of the Indian Armed Forces, other security forces and the Government of India. As our economy expands and India's economic interests grow, it is but expected that the requirements for the defence sector to meet the Army's modernisation challenges would increase too. It is therefore vital that the defence sector stays abreast with the requirements of the military and remains well poised to deliver at all times.

The Army Design Bureau provides an institutionalized interface between the Army, Industry and Academia to share each other's requirements, capabilities and concerns. The compilation of the fourth volume of 'Problem Statements' by the Indian Army is a welcome step towards creating indigenous solutions.

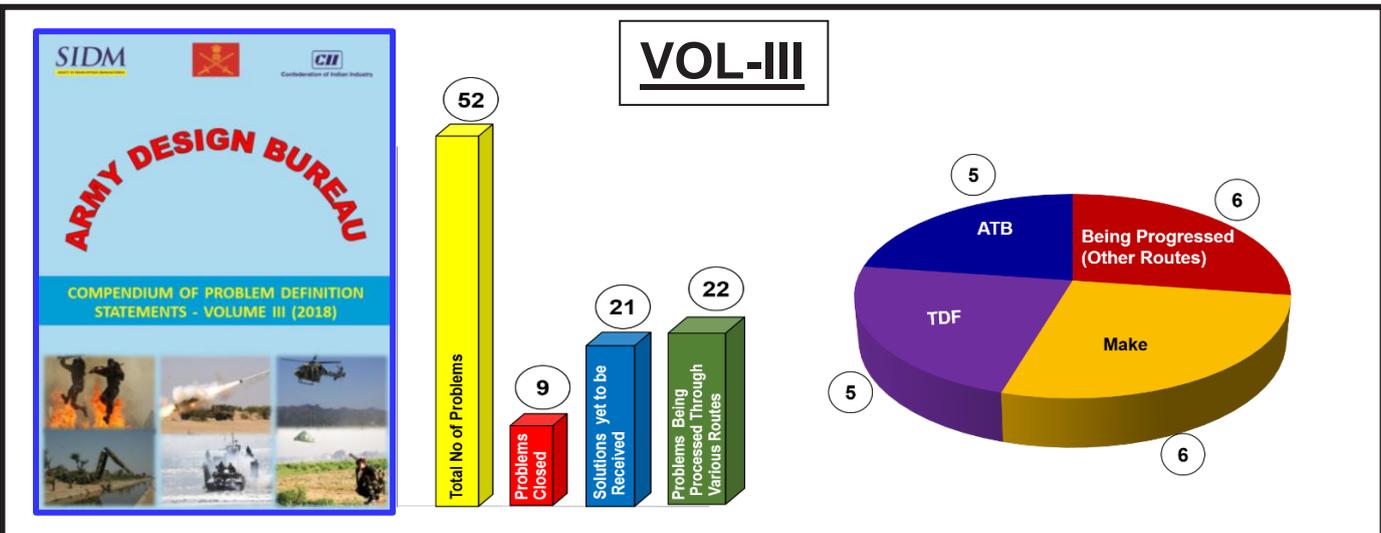
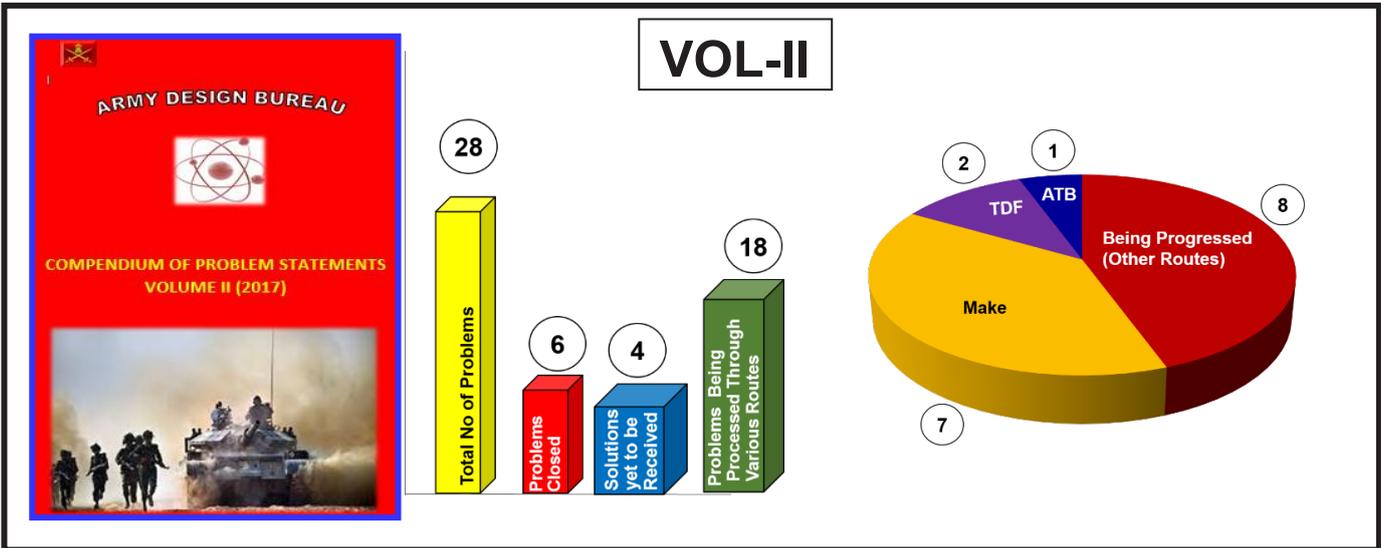
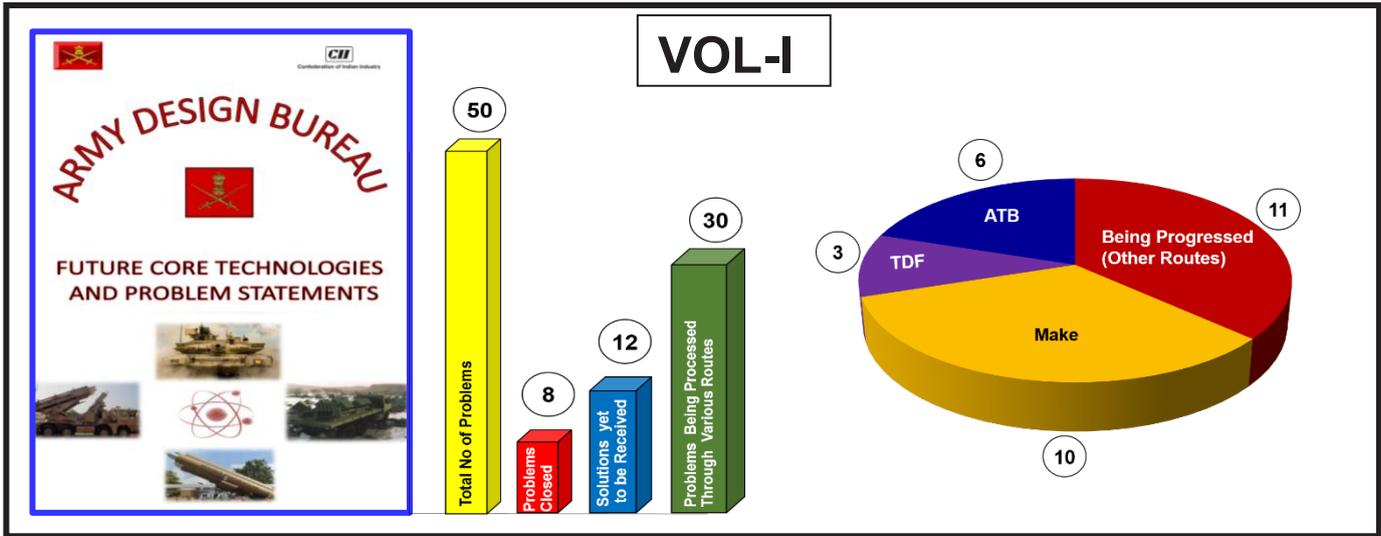
On behalf of the Indian Industry, I would like to affirm our commitment to the initiatives of the Ministry of Defence and the Indian Army.

A handwritten signature in blue ink, which appears to read 'Chandrajit Banerjee'. The signature is fluid and cursive, written on a light-colored background.

Chandrajit Banerjee  
Director General, CII



# STATUS UPDATE ON EXISTING PROBLEM DEFINITION STATEMENTS



Total Number of Problems	Problems closed	Solutions yet to be Received	Problem being Progressed through various Routes
130	23	37	70



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**STATUS UPDATE: PROBLEM STATEMENTS VOL I**

<b><u>PS</u></b>	<b><u>Nomenclature</u></b>	<b><u>Status</u></b>
1	Identification of Friend or Foe (IFF) System for Armoured Fighting Vehicle	Successfully Closed. Being pursued through iDEX challenge.
2	Buoyancy Enhancers for Infantry Combat Vehicle	Successfully Closed
3	Solar Assisted Auxiliary Power Unit for Armoured Fighting Vehicle	Being Progressed (Make)
4	Body Armour	Being Progressed (TDF). Also being pursued through iDEX challenge.
5	Situational Awareness	Being Progressed (ATB)
6	Night Vision Device	Being Progressed
7	Foliage Penetration Radar Technical Integration with Night Vision/Surveillance Devices	No Solution Received
8	Mobility of Guns in Mountains	Successfully Closed
9	Dispersion of Artillery Shells	Being Progressed (TDF)
10	Light Weight Alloy for Military Bridges	Being Progressed
11	Camouflage in Field : The Invisible Man	No Solution Received
12	Fuel Air Explosives for Minefield Breaching	No Solution Received
13	Light Weight Material Permanent Defences	Being Progressed
14	High Assurance Testing for Hardware	No Solution Received
15	All-in-one Mobile Communication Handsets	Being Progressed
16	Long Term Evolution (LTE) : Air Interface Vulnerabilities	Being Progressed
17	Secure Communication for (COTS) Equipment/IT Equipment/ Tele-Communication Equipment	Being Progressed
18	Software Defined Radio (SDR) in Mobile Adhoc Network (MANET) Environment	Being Progressed
19	Software based Encryption	Being Progressed
20	Indigenous Hardened Operating System	No Solution Received
21	Estimation of Trajectory of Spiraling Ballistic Missiles	No Solution Received
22	Compact and Ruggedized Power Supply	Being Progressed (Make)
23	Beam Steering for Lasers	No Solution Received
24	Metallurgy for Helicopter Main Gear Box	Successfully Closed
25	Magnetic Mapping of Advance Light Helicopter	No Solution Received
26	Satellite based Tracking System	Being Progressed (ATB)

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**STATUS UPDATE: PROBLEM STATEMENTS VOL I (CONTD)**

<b><u>PS</u></b>	<b><u>Nomenclature</u></b>	<b><u>Status</u></b>
27	Obstacle Avoidance System (Wire Strike Protection System)	No Solution Received
28	Mobile Aviation Support Vehicle	Successfully Closed
29	Night Vision Device for Aircrew	No Solution Received
30	Weather Radar	No Solution Received
31	Microwave Landing System	Being Progressed (Make)
32	Load Carrying Robots	Being Progressed (TDF)
33	High Calorific Value Food	Successfully Closed
34	Wound Healing Fabric	Being Progressed (Make)
35	Modular Generators for High Altitude	Being Progressed (Make)
36	Cold Climate Clothing	Being Progressed
37	All Terrain Ground Vehicle	Being Progressed (Make)
38	Unattended Surveillance Camera	Being Progressed
39	Location Awareness System	Being Progressed (ATB)
40	Vehicle Long System for Maintenance & Accounting of Military Vehicles	Successfully Closed
41	Military Grade Power Bank	Being Progressed (Make)
42	Power Bank for Communication Equipment	Being Progressed (Make)
43	Ultra Light Recovery Vehicles	Being Progressed (ATB)
44	Development of Snow Mobiles for Glaciated and Snow Bound Terrain	Being Progressed (Make)
45	Integrated Navigation Device	Being Progressed (ATB)
46	Acclimatization for High Altitude Development	Being Progressed (ATB)
47	Smart Vest for Identification of Friend or Foe (IFF)	Being Progressed (Make)
48	Sniper Scope	No Solution Received
49	Automated Equipment Health Monitoring System (AEHMS) for Equipment and Vehicles	Successfully Closed
50	Fuel, Oil and Lubricants (FOL) Storage in Operational Conditions	Being Progressed

**STATUS UPDATE: PROBLEM STATEMENTS VOL II**

<b><u>PS</u></b>	<b><u>Nomenclature</u></b>	<b><u>Status</u></b>
51	De-Rating of Engine at High Altitude Areas	Successfully Closed
52	Improving Cooling Efficiency of T-90 Radiator	Being Progressed
53	Pre-Heater for Bridge Laying Tank T-72	Successfully Closed
54	Thermal Imager Detector Technology	No Solution Received
55	Sensor Threat Warning Systems	Being Progressed (Make)
56	Loss of Orientation	Successfully Closed
57	Camouflage in Field : Armoured Fighting Vehicles (AFVs)	No Solution Received
58	Oil Leakage from Cylindrical Mast of 17 meters Mobile Mast	Being Progressed
59	Dead Zone Surveillance System	Being Progressed (Make)
60	Integrated Command Post Vehicle	Being Progressed (Make)
61	High Power Microwave Radiation System	No Solution Received
62	Air-Ground Communication between Army Aviation Helicopters with Ground troops and Enhanced Battle Field Transparency	Being Progressed
63	Power Management in High Altitude Areas with Sub Zero Temperature	Being Progressed (TDF)
64	Sewage Disposal in High Altitude Regions	Being Progressed (ATB)
65	Bridging Challenges in Mountains and Improvised Equipment	Successfully Closed
66	Water Mobility Equipment in Creeks	Being Progressed (Make)
67	Combat Zone Tracking System	Successfully Closed
68	Emergency Training Simulator for Static Line Jump	Being Progressed
69	Virtual Reality Based Training Simulator for Room Intervention/ Urban Warfare	Being Progressed
70	Reduced Life of Hand Held Thermal Imager Battery	Being Progressed (TDF)
71	Remotely Operated System for In-service Weapon and Vehicles	Being Progressed (Make)
72	Design and Development of Aerial Surveillance Platform Hexacopter/ Quadcopter, Seeker and Shooter Combat Management System	Being Progressed (Make)
73	Long Range Optical Target Locator	Being Progressed
74	Man Portable Radio Relay Frequency Equipment	Being Progressed (Make)
75	Electronic Warfare System on Star Topology	No Solution Received
76	Containerised Logistics Shelters	Successfully Closed
77	Fuel, Oil and Lubricants Storage in Operational Conditions	Being Progressed

**STATUS UPDATE :PROBLEM STATEMENTS VOL III**

<b><u>PS</u></b>	<b><u>Nomenclature</u></b>	<b><u>Status</u></b>
78	Development of Light Weight Non Skid Chain Accessories	Being Progressed
79	Passive Protection System for Armoured Fighting Vehicles	Successfully Closed
80	Inert Training Ammunition for Mechanised Forces	No Solution Received
81	Procurement of New Glow System for Bofors 155 mm Field Howitzer 77 B O2	No Solution Received
82	Development of Titanium Based Light Weight 120 mm Mortar	No Solution Received
83	Range of Smart Munitions, Fuzes and Mines	Being Progressed (ATB)
84	Programmable, Pre-fragmented, Proximity (3P) Ammunition for 40 mm L/70 Gun	Being Progressed (Make)
85	Wheeled or Self Propelled System for ZU Gun	No Solution Received
86	Installation of IRNSS (Navik) based GPS System in A & B Vehicles	Being Progressed
87	Surveillance of Passes through Mini UAVs and Helikite/ Mini Aerostats	Being Progressed (ATB)
88	Development of Drone/ Unmanned Aerial Vehicle Countermeasure Technology	Being Progressed (ATB)
89	Hostile Fire Detection and Positioning System	Being Progressed
90	Development of Enhanced Unattended Ground Sensor System	Being Progressed
91	Geo-Referencing of inputs from UAV and Electro-Optical Devices	No Solution Received
92	Power Management at Observation Post	Being Progressed (TDF)
93	Common Meteorological Probing Platform for Long Range Vectors	No Solution Received
94	Thermal Imager Integrated Observation Equipment (TIIOE)	Being Progressed
95	Need for Application Security	No Solution Received
96	Integration of Application on Disparate Networks	No Solution Received
97	Digital Signature without Hardware Token and Central Public Key Infrastructure	No Solution Received
98	Mechanism for Fast Prototyping Method for Developing Modular Applications	No Solution Received
99	Integrated Quartermaster Package Adopter Module	No Solution Received
100	Commander's Module for Human Resource management System	Successfully Closed
101	Human Resource Management System E-mail Module	Successfully Closed
102	Auto Sync of Human Resource Management System and Integrated Quarter Master Package Databases	Being Progressed (Make)
103	Android Version of One Module of Human Resource Management System	Successfully Closed
104	Enhancement to Central Utility of Human Resources Management System	Successfully Closed

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**STATUS UPDATE: PROBLEM STATEMENTS VOL III (CONTD)**

<b><u>PS</u></b>	<b><u>Nomenclature</u></b>	<b><u>Status</u></b>
105	ERP for Management Information System	Successfully Closed
106	Data Exchange between dependent applications	Successfully Closed
107	Integration of Applications with Disparate Security Profile	No Solution Received
108	Decoding and De-multiplexing of Intercepted Hostile Transmission	No Solution Received
109	Online Translation of Chinese Intercepts in Different Dialects	Being Progressed (TDF)
110	Development of Video Compression Techniques to Transmit Video/HD Images on Half Duplex VHF Band	No Solution Received
111	Automatic Changeover from Primary Mode of Communication Media to Secondary Media in case of Failure of Primary Media	No Solution Received
112	Secure Mobile Communication Architecture incl Prophylactic Security with Geo-Fence Control-Smart Phones	Being Progressed
113	Test Equipment for Testing of Anti-Tank Guided Missile Launchers of BMP-II	Successfully Closed
114	Development of Augmented Reality Based Solutions for carrying out of Preventive Maintenance and Fault Diagnosis of various equipment by the user	Being Progressed
115	Test Equipment: Checking Barrel Wear of Artillery Guns (Laser Based Inspection)	No Solution Received
116	Hybrid Vehicles for High Altitude Areas	Successfully Closed
117	Precision Drones with Higher Payloads for Delivering Stores	Being Progressed (TDF)
118	Hydraulic AFV Lifting Device & Ramp	No Solution Received
119	Design & Development of Indigenous All-Terrain Vehicle (ATV)	Being Progressed (Make)
120	Engine Auto Shut Down Mechanism for 'A' Vehicles	No Solution Received
121	Metal Composites & 3D Metal Printing for Production of Spares	Being Progressed (ATB)
122	Extreme Cold Climate (ECC) Clothing for Crew of Armoured Fighting Vehicle (AFV)	Being Progressed (Make)
123	Poor Battery Life of LRF LH-30	Being Progressed (TDF)
124	Composite Medical Diagnostic Equipment for Posts	No Solution Received
125	Rapidly Deployable Mobile Operation Theatres	No Solution Received
126	Fuel Cell Technology	Being Progressed (TDF)
127	Test Kits for Checking Quality of Meat	No Solution Received
128	Design of Modular Reinforced Cement Concrete (RCC) Structures	Being Progressed (Make)
129	Heated Shelters	Being Progressed (Make)
130	Modular Habitat for High Altitude Area	Being Progressed (ATB)



## **PROBLEM STATEMENTS: VOL IV**

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## **PROBLEM STATEMENT - 131**

### **SMARTISATION OF ANTI INFILTRATION OBSTACLE SYSTEM (AIOS)**

1. **Short Title.** Smartisation of Anti Infiltration Obstacle System (AIOS).
2. **User Directorate(s).** Infantry.
3. **Type of Problem.** Partially Solved.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** The existing AIOS was erected in 2003-05 along the Line of Control (LC) to prevent terrorist infiltration. It is essentially a physical barrier, the entire stretch of which has to be physically manned by our soldiers 24x7, to achieve the desired results which in terms of human resource and capability is extremely demanding. The smartisation of the AIOS as per new technology including cameras & sensors incorporating better surveillance features and Artificial Intelligence, suitably integrated to provide a coherent picture will contribute immensely in further enhancing the effectiveness of the AIOS.
  - (b) **Evolution of Problem.** Preventing trans-border infiltration in the state of Jammu & Kashmir is essential for eradicating terrorism. Accordingly, an AIOS was conceived and entire stretch has to be physically dominated to enhance its efficacy requiring large numbers of human resources. Smartisation of the AIOS will enable overcoming this challenge as well as enhance its efficacy.
  - (c) **How is it Being Overcome?** Presently the existing LC Fence (AIOS) is dominated physically by troops with employment of surveillance devices available with units. To establish surveillance grid or integration of the existing resources to provide a coherent picture is a challenge.
  - (d) **Any Innovations to Locally Overcome Problem.** By employment of surveillance devices/resources available with the Units and may vary from sector to sector.
5. **Who has the Problem?**
  - (a) **User (Skill Sets).** Infantry.
  - (b) **Operational Environment.** A combination of Hill Sector, Jungles and undulating terrain interspersed with Nallahs and High Altitude Area. Project to be implemented in a phased manner based on priority of sectors and ground requirements.
  - (c) **Periodicity of Exploitation.** Throughout the year.
6. **Why it is Important to Solve?** Preventing infiltration by exploiting the new surveillance technologies is essential to effectively counter terrorism in the state of Jammu & Kashmir.
7. **Contemporary Solutions by Other Countries/Organizations.** Few of the projects being implemented world over are Smart Fence by Israel and border fence between United States & Mexico.

8. **Primary Contact.**

Army Design Bureau  
Telephone Number: 011-23019003  
E mail: ddgtechres-mod@gov.in

9. **Secondary Contact.**

Colonel Infantry-3  
Directorate General of Infantry  
Telephone Number: 011-23333819

**PROBLEM STATEMENT - 132****ARTIFICIAL INTELLIGENCE (AI) MONITOR FOR SURVEILLANCE**

1. **Short Title.** AI monitoring system is required to convert the legacy Surveillance camera inputs into smart inputs using AI.
2. **User Directorate(s).** Directorate General of Artillery.
3. **Type of Problem.** Unsolved and Technology infusion by innovative adaption.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** A plethora of surveillance devices are being utilized to achieve Battle Field Transparency, but being legacy systems they need to be continuously manned and monitored.
  - (b) **Evolution of Problem.** Commercially Off The Shelf (COTS) Surveillance devices are being utilized to achieve Battle Field Transparency.
5. **Who has the Problem?** Legacy Surveillance camera users.
6. **Why it is Important to Solve.** AI based monitor for surveillance will reduce the operators fatigue and free resources for other tasks.
7. **Contemporary Solution by Other Countries / Organisations.** COTS low power, low cost and ultra-portable plug in solutions have been showcased in Defence seminars and exhibitions.
8. **Primary Contact.**

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9. **Secondary Contact.**

Directorate General of Artillery  
Telephone Number: 011-23018527

**PROBLEM STATEMENT - 133**

**UNMANNED AERIAL VEHICLES (UAV) FOR TARGET ACQUISITION  
POST STRIKE DAMAGE ASSESSMENT (PSDA)**

1. **Short Title.** UAV for target acquisition and PSDA.
2. **User Directorate(s).** Directorate General of Artillery
3. **Type of Problem.** Limitation of existing payload / Unsolved.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** There is a restricted availability and employment of current target acquisition and PSDA resources. In such a scenario it is difficult to provide assured / dedicated real time target acquisition/ PSDA resources to Long Range Vectors (LRVs), thereby denying optimal exploitation of these Force Multipliers.
  - (b) **Evolution of Problem.** There is a need for providing assured / dedicated real time target acquisition/ PSDA.
5. **Who has the Problem?** Employment of LRVs needs improved assured and dedicated target acquisition & PSDA.
6. **Why it is Important to Solve.** The solution is important to improve effectiveness of real time target engagement in depth by LRVs and ensure dedicated and assured resources which will result in closing sensor-shooter link in the fastest and most efficient manner. A desirable solution would require:-
  - (a) It should have deployment capability over the target at varied ranges with high endurance to enable engagement as well as PSDA.
  - (b) It should be equipped with Electro Optical/Infra-Red multi spectral payload for surveillance and target acquisition and should assist in real time target engagement and PSDA. It should also have a data link for real time connectivity with a ground station.
7. **Contemporary Solution by Other Countries / Organisations.** Not known
8. **Primary Contact.**

Army Design Bureau  
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E mail : ddgtechres-mod@gov.in
9. **Secondary Contact.**

Directorate General of Artillery  
Telephone Number: 011-23018527

**PROBLEM STATEMENT - 134**

**DEVELOPMENT OF ADVANCE ELECTRO OPTICAL / INFRA RED SENSORS  
FOR UNMANNED AERIAL VEHICLE (UAV)**

1. **Name of Proposal.** Development of advance Electro Optical / Infra Red sensors for UAV.
2. **User Directorate(s).** Directorate General of Artillery.
3. **Type of Problem.** Poor solution / Unsolved.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** The current Electro Optical / Infra Red sensors for UAVs have limited resolution & impose weight penalty on aerial platform.
  - (b) **Evolution of Problem.** Existing UAV payload technology is not commensurate to the mission effort.
  - (c) **How it was Being Overcome.** Currently conventional payloads are being utilized.
  - (d) **Any Innovations.** No
5. **Who has the Problem?**
  - (a) **User (Skill Sets).** Artillery Directorate.
  - (b) **Operating Environment.** Conventional and Counter Insurgency / Counter Terrorist operation.
  - (c) **Periodicity of Exploitation.** Frequent.
6. **Why it is Important to Solve?**
  - (a) Multiple Camera in one sensor package with the sensors to detect multiple targets.
  - (b) Both day and night capability in single payload will obviate requirement of different configurations.
  - (c) It should have capability to go back in time and view individual images in terms of time and geo reference.
  - (d) Incorporation of target designation and engagement capability.
  - (e) All the above capabilities needs to be incorporated while still keeping it light weight implying inclusion / development of futuristic cutting edge technologies.
  - (f) Capability for integration with AI system and Battle Field Surveillance System (BSS).

7. **Contemporary Solution by Other Countries / Organisations.** Multi sensor  
camera payload with United State of America & Israel.

8. **Primary Contact.**

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Telephone Number: 011-23018527

**PROBLEM STATEMENT - 135****COUNTER UAV, ROCKET, ARTILLERY & MORTAR (C-URAM) SYSTEM**

1. **Short Title.** Counter UAV, Rocket, Artillery & Mortar (C-URAM) System.
2. **User Directorate.** Directorate General of Army Air Defence.
3. **Type of Problem.** Partially Solved.
4. **What is Problem (Need)?**
  - (a) **Statement of Problem.** Proliferation of various types of UAVs & Rocket, Artillery & Mortar (URAM) means with our adversaries require cost effective solutions for countering them.
  - (b) **Evolution of the Problem.** Limited ability of existing Air Defence equipment to neutralise URAM threat (Mini & Micro UAVs, UCAVs, rocket, artillery & mortars) poses immense danger to own combat elements.
  - (c) **How it was Being Overcome.** Non- availability of dedicated C-URAM system in the present inventory necessitates induction of such systems.
5. **Who has the Problem?** Army Air Defence units.
6. **Why is it important to Solve?** Non-neutralisation of enemy's URAM threat will provide our adversaries with an edge by shortening his Observe-Orient-Decide-Act (OODA) loop and enhance his combat power. Preservation of own combat elements from enemy's URAM threat is an operational imperative. There is also a requirement to have cost effective solution to deal with URAM threat because of multiplicity of threat.
7. **Contemporary Solution by Other Countries/ Organisations.**
  - (a) Iron Dome- Israeli C-URAM System.
  - (b) Miniature Hit to Kill (MHTK) for C-RAM & C-UAS by Lockheed Martin.
  - (c) Directed Energy Weapons (DEWs).
  - (d) Smart Ammunition.

8. **Point of Contact.**(a) **Primary Contact.**

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(b) **Secondary Contact.**

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**PROBLEM STATEMENT – 136**

**SECURING COMMUNICATIONS USING  
QUANTUM KEY DISTRIBUTION (QKD)**

1. **Short Title.** Securing Communications using Quantum Key Distribution (QKD).
2. **User Directorate(s).** Directorate General of Signals.
3. **Type of Problem.** Poorly solved problem and adaptation.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.**
    - (i) Many important aspects of security in our current information technology rely on encryption. Confidentiality is achieved by symmetric and asymmetric encryption techniques. Both the encryption techniques are based in turn on mathematical algorithms that are considered to be very difficult to be broken by computers based on classical physics. Most of the current algorithms with suitable key lengths (for example AES-128 & RSA-2048) are secured even when subjected to brute force attack for centuries using massive computing power.
    - (ii) Computers based on quantum physics can implement unique algorithms (for example Shor's algorithm) which will enable an exponential increase in capability and thus reduction in the time taken to break the algorithms being used currently. Asymmetric algorithms like Rivest, Adi Shamir and Leonard Adleman and Elliptic Curve Digital Signature Algorithm will be rendered useless once we have a quantum computer of sizeable quantum bits (qubits).
  - (b) **Evolution of the Problem.** An n-qubit quantum computer can simultaneously access  $2^n$  possible configuration of key of length n. Therefore a quantum algorithm of n-bit string with simultaneous operation can in principle lead to a constructive interference towards the key that we want to break. A sizeable quantum computer will break nearly every practical application of cryptography which is in use today in days which otherwise would have taken centuries to be broken by computers based on classical physics.
  - (c) **How was it Being Overcome?** Problem not yet resolved.
  - (d) **Any innovation to locally overcome the problem.** Nil
5. **Who has the Problem?**
  - (a) **Users.** Indian Army
  - (b) **Operating Environment.** Pan India operating environment both during war and peace for secure transmission of triple play services within the armed forces.

(c) **Periodicity of Exploitation**. Periodicity of exploitation is round the clock i.e 24 X 7 X 365 days.

6. **Why it is Important to Solve?**

(a) In last few years there has been tremendous development in the field of quantum computing across the world and practical quantum computers with few qubits have already been reported due to which present encryption techniques might become useless in few years.

(b) Only way to secure communication from attacks using quantum computers is to use quantum keys. Quantum keys are generated making use of intrinsic features of the quantum science. This quantum key will have origin from the quantum mechanics with key principles like entanglement, superposition and tunnelling and will be protected by the laws of nature unlike the current keys which have mathematical origin.

(c) Developing a simple Quantum Key Distribution System (QKDS) is a first step towards securing our keys and information from attack by adversaries.

7. **Contemporary Solution by Other Country/ Organizations.**

(a) **International.** Currently China has demonstrated secured quantum communication over long distance (around 400km) with the help of quantum satellite. Though early initiatives have been from Europe, Canada, Japan, and USA, Chinese academia and military have taken up quantum technologies as their key to establish prominence in the world. They are currently way ahead of USA or Europe where initial efforts began.

(b) **National.** Department of Science and Technology (DST) has promised support to individual projects on quantum sciences and technology in the country. This will largely be in the direction of developing man power required in the country to handle future quantum technological advancements. ANURAG, a Defence Research and Development Organisation Lab has also started work in the field of QKD in a limited manner.

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**PROBLEM STATEMENT - 137**

**BLOCK CHAIN TECHNOLOGY: MILITARY USAGE**

1. **Short Title.** Block Chain Technology: Military Usage
2. **User Directorate(s).** Directorate General of Signals.
3. **Type of Problem.** Technology Infusion
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** Human Resource Management in Armed Forces, personal documents / records using Secure Data Storage.
  - (b) **Evolution of Problem.** From the day an individual joins the Armed Forces, all type of documents related to the individual are maintained viz persons file, part II orders, posting profile, career courses, Annual Confidential Report, medical documents, financial documents (payslips, Army Forces Personal Provident Fund/ Defence Service Officers Provident Fund) etc. However, various agencies maintain documents about the same individual separately with updates to these also handled separately. The same could be made better, by use of block chain technology with an underlying Secure Data Storage.
  - (c) **How it was Being Overcome.** As on date, this problem is being faced by multiple agencies and all have different ways of addressing it. Almost all have separate automated customised solutions. The problem however can have a better solution based on block chain technology.
  - (d) **Any Innovations to Locally Overcome the Problem.** There are multiple agencies dealing with types of documents pertaining to an individual. A few innovation/ local solutions are as under:-
    - (i) Part II Order : Human Resource Management System
    - (ii) Clothing : Vastra
    - (iii) Financial : Payslip/ Provident Fund Principal Controller Defence Account (Office)/Pay Account Office (Other Ranks).
5. **Who has the Problems?** All directorates have this problem as it pertains to documents for all individuals of the Armed Forces i.e. Officers, Junior Commissioned Officers and Other Ranks.
  - (a) **User (Skill Set).** The user base maintaining the documents are fairly trained and experienced and have the required skill set.

(b) **Operating Environment**. The operational environment is spread across the Army Data Network (ADN) and is controlled centrally in almost all the cases by respective administrators like record offices / directorates.

(c) **Periodicity of Exploitation**. The periodicity of the problem is frequent, as the documents are pertaining to all the individuals and resolution is required for errors/ omissions on a daily basis.

6. **Why is it Important to Solve?** The documents are related to all important areas of an individual like, financial, medical, Annual Confidential Reports, leave, part II, field conduct sheet, sheet roll etc. These documents are important for the individual and most decisions by the organisation are taken based on these documents. An improved record keeping will therefore, improve overall functioning.

7. **Contemporary Solutions by Other Countries / Organisation**. Militaries of Russia, China and USA have invested into research on block chain technology to be used in various aspects of the military. A few are:-

- (a) Asset and Supply Chain Management.
- (b) Critical weapons system.
- (c) Human Resource Management.
- (d) Secure Data Storage.
- (e) Secure communication (voice and data).

8. **Primary Contact**.

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9. **Secondary Contact**.

- (a) Directorate General Signals/Signal-7.
- (b) Army Headquarters Computer Centre.

**PROBLEM STATEMENT - 138**

**MILITARY OBJECT DETECTION IN SATELLITE IMAGERY  
USING ARTIFICIAL INTELLIGENCE (AI)**

1. **Short Title.** Military Objective Detection in Satellite Imagery UAV Video using Artificial Intelligence / Deep Learning (DL) technology.
2. **User Directorate(s).** Military Intelligence Directorate, Signal Intelligence Directorate and Infantry Directorate.
3. **Type of Problem.** Solved manually as on date.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** Use of AI / DL towards development of an AI engine for analysis of monochromatic / multi-spectral Satellite Imagery / UAV Video. AI engine will enable Military Object detection, classification, pattern recognition and decision support.
  - (b) **Key Specifications / Features / Parameters required in Proposed Product / Solution.** The AI / DL based Satellite Image / UAV Video analysis system should be able to achieve following in phases:-
    - (i) **Target Identification.** Locate Military object with reasonable accuracy in a given monochromatic / multi - spectral satellite imagery / UAV video in real-time.
    - (ii) **Target Class.** Classify Military object detected in satellite imagery / UAV video in real - time.
    - (iii) **Pattern Recognition.** Pattern recognition to infer intent of enemy from satellite imagery / UAV video in real-time.
    - (iv) **Decision Support.** Aiding field commander in taking Military decision in a particular scenario/situation by suggesting suitable course of actions.
5. **Who has the Problem?** It is proposed to explore power of contemporary technology like Artificial Intelligence (AI) to solve this problem in real-time.
6. **Why is it important to solve?** The AI/DL bases Satellite image analysis system would give following advantages:-
  - (a) Satellite Image analysis in real time.
  - (b) Manpower effectiveness.

7. **Contemporary Solutions by other Countries / Organisations.** Information not available.

8. **Point of Contact.**

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**PROBLEM STATEMENT – 139**

**FACE RECOGNITION USING ARTIFICIAL INTELLIGENCE (AI)**

1. **Short Title.** Use of AI / Deep Learning (DL) technology for face recognition.
2. **User Directorate(s).** Military Intelligence Directorate, Signals Intelligence Directorate and Infantry Directorate.
3. **Type of Problem.** Solved manually as on date.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** Face recognition is a very important aspect to distinguish between friend and foe. There is no automated face recognition system existing in Indian Army to recognise enemy face in Real-Time. Hence, there is a need to deploy AI/DL enabled technology to automatically establish identity of enemy.
  - (b) **Key Specification / Features / Parameters required in Proposed Product / Solution.** The AI / DL based face recognition system should be able to achieve following:-
    - (i) The AI / DL engine should be able to establish identity of enemy in real-time through still images/video footage.
    - (ii) The AI/DL engine should tag the identified enemy along with his identity.
5. **Who has the Problem?** It is proposed to explore power of contemporary technologies like Artificial Intelligence (AI) to solve this problem in real-time.
6. **Why is it important to solve?** The AI/DL based face recognition systems would give following advantages:-
  - (a) Face recognition / identity in enemy in Real-Time.
  - (b) Enabling own personnel to initiate suitable action in short time.
7. **Contemporary Solutions by other Countries / Organisations.** Information not available.
8. **Point of Contact.**
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**PROBLEM STATEMENT – 140****AIRBORNE FIRE CONTROL RADAR FOR ATTACK HELICOPTERS**

1. **Short Title.** Airborne Fire Control Radar for Attack Helicopters.
2. **User Directorate(s).** Directorate General of Army Aviation.
3. **Type of Problem.** Technology Infusion.
4. **What is the Problem?**
  - (a) **Statement of Problem.** As of now Attack Helicopter pilots have only EO/IR pod for detection of targets with limited operation capability in deteriorated visibility conditions.
  - (b) **Evolution of the Problem.** Human and equipment restrictions of detecting and tracking multiple targets in battle zone as also in deteriorated visibility conditions significantly reduces the effective employment of Attack Helicopters.
  - (c) **How it was Being Overcome.** Pilots have to manually track the target using the EO/IR pod.
  - (d) **Any Innovations to Locally Overcome the Problem.** Nil.
5. **Who has the Problem?** Attack Helicopter pilots.
6. **Why is it Imp to Solve?** In order to enhance the strike capability of Attack Helicopters and increase their survivability.
7. **Contemporary Solution by other Countries/ Organisations.** Proprietary Airborne Fire Control Radars.
8. **Point of Contact.**
  - (a) **Primary Contact.**

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**PROBLEM STATEMENT – 141**

**CARGO SLING EQUIPMENT AND RESCUE HOIST  
EQUIPMENT FOR LIGHT HELICOPTERS**

1. **Short Title.** Cargo Sling Equipment and Rescue Hoist Equipment for Light Helicopters.
2. **User Directorate(s).** Directorate General of Army Aviation.
3. **Type of Problem.** Poorly Solved.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.**
    - (i) **Cargo Equipment.** Carriage of heavy equipment to remote places which cannot be carried inside the helicopter requires cargo sling equipment. The heavy load is carried under slung from the helicopter. It is a lifeline for all the remote posts for their supply of ammunition, equipment, Fuel Oil Lubricants (FOL) and rations. Upgraded and durable cargo sling equipment is a necessity for operations by Cheetah/Chetak and Cheetal helicopters.
    - (ii) **Rescue Hoist Equipment.** This equipment is required for winching in/ out men/material in places with constricted space and surrounded by obstacles. Durable and heavy duty equipment which has a low failure rate is required for various helicopter operations.
  - (b) **Evolution of the Problem.** Both the Cargo Sling and Rescue Hoist are required for operations which are peculiar to helicopters. Equipment which can easily be maintained and can be used a number of times will enhance operational capability of the Army Aviation units.
  - (c) **How it is Being Overcome.** Present equipment fitted on the helicopters has maintenance issues along with shortage of spares. Cannibalisation is being resorted to for serviceability of equipment.
  - (d) **Any Innovations to Locally Overcome the Problem.** Nil.
5. **Who has the Problem?**
  - (a) **User (Skill sets).** Army Aviation Pilots and maintenance crews.
  - (b) **Operating Environment.** Cargo and Rescue Hoist operations are carried out in all operational areas. It is a vital task of helicopters which is utilised in all kind of operations.
  - (c) **Periodicity of Exploitation.** Aviation units use the cargo and winching equipment for regular operations.

6. **Why it is important to Solve?** Cargo Sling and Rescue Hoist equipment are required for vital tasks carried out by Army Aviation units. Serviceable and reliable equipment would enhance the operational preparedness of the units and thereby the formations.

7. **Contemporary Solution by other Countries/ Organisations.** Cargo Sling and Rescue Hoist equipment are customised for each type of helicopter.

8. **Point of Contact.**

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**PROBLEM STATEMENT - 142**

**GUN RAISING, LOWERING & LEVELLING MECHANISM FOR L-70 GUN**

1. **Short Title.** Gun Raising, Lowering & Levelling Mechanism for L-70 Gun.
2. **User Directorate (s).** Directorate General of Army Air Defence.
3. **Type of Problem.** Unsolved.
4. **What is Problem (Need)?**
  - (a) **Statement of Problem.** Requirement to fabricate a Gun Raising, Lowering and Levelling mechanism for 40mm L-70 Gun to reduce the deployment time.
  - (b) **Evolution of the Problem.** The present deployment drills for 40mm L-70 gun are manual and time-intensive and need to be reduced in view of ever enhancing air threat.
  - (c) **How it was being overcome.** Raising, Lowering & Levelling of L-70 gun is done manually as per laid down drills.
5. **Who has the Problem?** All units of Army Air Defence holding 40mm L-70 gun.
6. **Why is it Important to Solve?**
  - (a) Advancements in air threat and need to expedite deployment drills to provide effective AD protection.
  - (b) Adaptation of available automation and pneumatic technology to mechanise the deployment drills of 40mm L-70 gun.
7. **Contemporary Solution by Other Countries/ Organisations.**
  - (a) Auto levelling jacks for various equipment World over.
  - (b) Availability of pneumatic and sensor technology which can be suitably adapted for raising, lowering & levelling of 40mm L-70 gun.
8. **Point of Contact.**
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**PROBLEM STATEMENT - 143**

**INTERFACE MECHANISM FOR TRANSFER OF DIGITAL DATA DIRECTLY FROM FLYCATCHER (FWCS) RADAR TO 'UPGRADED' ('U') L-70 GUN**

1. **Short Title.** Interface Mechanism for Transfer of Digital Data Directly from Flycatcher (FWCS) Radar to 'U' L-70 Gun.
2. **User Directorate(s).** Directorate General of Army Air Defence.
3. **Type of Problem.** Unsolved.
4. **What is Problem (Need)?**
  - (a) **Statement of Problem.** The un-upgraded L-70 gun utilises a Gun Data Receiver (GDR) for converting digital data received from radar to analogous form for utilisation by gun & vice versa for radar controlled L-70 Gun. 'U' L-70 gun has a System Management Computer (SMC) which utilises digital data instead of analogous data. Digital data in respect of aerial targets from FWCS radar can be directly fed to 'U' L-70 gun for operating the gun.
  - (b) **Evolution of the Problems.** The solution will facilitate transfer of digital data directly from FWCS Radar to 'U' L-70 gun without need for a Gun Data Receiver (GDR) & associated cables.
  - (c) **How it was Being Overcome.** At present, 'U' L-70 guns are also being deployed with a GDR to transfer the target data from FWCS radar to L-70 guns.
5. **Who has the Problem?** All units of Army Air Defence holding 40mm L-70 gun.
6. **Why is it Important to Solve?** Reduction of unnecessary linkages of GDR & cables will lead to refined deployment drills & ease of operation of 'U' L-70 gun. This will also help in reducing the overall deployment time aiding in provision of effective air defence protection.
7. **Contemporary Solution by Other Countries/ Organisations.** Defence Public Sector Units/ Defence Research and Development Organisation / Private Vendors have capability to undertake this software configuration challenge.
8. **Point of Contact.**
  - (a) **Primary Contact.**

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**PROBLEM STATEMENT - 144**

**INDIGENISATION OF CRITICAL SUB-ASSEMBLY OF  
VARIOUS ARMY AIR DEFENCE EQUIPMENT**

1. **Short Title.** Indigenisation of Critical Sub- assemblies of various Army Air Defence Equipment.
2. **User Directorate(s).** Directorate General of Army Air Defence.
3. **Type of Problem.** Unsolved.
4. **What is Problem (Need)?**
  - (a) **Statement of Problem.** The serviceability of Air Defence weapon system is affected due to non-availability of ex-import spares. There is a requirement of indigenisation of critical spares of various Air Defence systems to sustain equipment in service for the balance residual life.
  - (b) **Evolution of the Problem.** Complete dependency for few spares of Air Defence weapon system on imports coupled with drying up of import sources has led to need for indigenisation.
  - (c) **How it was Being Overcome.** Items were being procured ex import & few items were being cannibalised from unserviceable equipment. Local indigenous manufacturing or adaptation is a stop-gap measure because of suspect quality.
5. **Who has the Problem?** Army Air Defence units holding Air Defence Guns & Missile Systems.
6. **Why is it important to Solve?** To ensure high equipment serviceability of Army Air Defence Equipment till induction of successor weapon systems.
7. **Contemporary Solution by Other Countries/ Organisations.** With advent of design technology, indigenous designing & manufacture of these critical sub-assemblies of Air Defence weapon systems can be designed & fabricated within the country preventing reliance on ex-import sources.
8. **Point of Contact.**
  - (a) **Primary Contact.**

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**PROBLEM STATEMENT – 145****DEVELOPMENT OF MODULAR POWERPACK FOR ARMOURED FIGHTING VEHICLES**

1. **Title.** Development of Modular Powerpack for Armoured Fighting Vehicles.
2. **User Directorate.** Directorate General of Electronics and Mechanical Engineers.
3. **Type of Problem.** Technology Infusion.
4. **What is the Problem (Need)?** Effort and time penalty in replacement/repair of existing engines and transmission system of Armoured Fighting Vehicles like tank T-72 and T-90 is high in comparison to the power pack of Main Battle Tank Arjun. Presently, replacement of engine of tank T-72 and T-90 requires a team of four technicians working continuously for 18 to 24 hours, whereas the time and effort required in replacement of complete power pack of Main Battle Tank Arjun is 45 minutes to an hour with four persons. This time line gets further enhanced when the task is performed during operational environment.
5. **Who has the Problem?** The sustenance agency and user is affected as the equipment remains unavailable for more than 24 hours.
6. **Why it is Important to Solve.** It is important to resolve the issue to reduce the Mean Time Taken to Repair (MTTR) in replacement / repair of engines during operations and thereby enhance availability of the equipment.
7. **Contemporary Solutions by Other Countries/ Organization.** The power pack of tank T-14 is designed as one single unit and can be replaced in 30 minutes in the field conditions.
8. **Point of Contact.**
  - (a) **Primary Contact.**

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  - (b) **Secondary Contact.** Faculty of Electronics and Mechanical Engineering of Military College of Electronics and Mechanical Engineers, Secunderabad.

**PROBLEM STATEMENT – 146****DEVELOPMENT OF INDIGENOUS DETECTOR DEWAR COOLER (DDC)**

1. **Title.** Development of Indigenous Detector Dewar Cooler (DDC).
2. **User Directorate.** Directorate General of Electronics and Mechanical Engineers.
3. **Type of Problem.** Unsolved.
4. **What is the Problem (Need)?** Detector Dewar Cooler (DDC) is the heart of all Thermal Imaging devices. However, the same are being imported from countries like Israel and France.
5. **Who has the Problem?** Indian Army.
6. **Why it is Important to Solve.** Impetus for night enablement of Indian Army has exponentially increased the number of Thermal Imaging Devices, over a period of time. It is imperative that an indigenous DDC is available with the Indian Army to ensure self-reliance and continuous sustenance of night operations capability.
7. **Contemporary Solutions by Other Countries/ Organization.** Development of Indigenous Detector Dewar Cooler (DDC).
8. **Point of Contact.**
  - (a) **Primary Contact.**

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  - (b) **Secondary Contact.** Directorate General of Electronics and Mechanical Engineers

**PROBLEM STATEMENT – 147**

**AERIAL MINE / EXPLOSIVE ORDNANCE DETECTION SYSTEM**

1. **Short Title.** Aerial Mine / Explosive Ordnance Detection System.
2. **User Directorate(s).** Combat Engineers Directorate.
3. **Type of Problem.** Unsolved.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** There is a need for developing an aerial mine/explosive ordnance detection system to enable remote and accurate detection of mines and hazardous explosives in a speedy and safe manner.
  - (b) **Evolution of Problem.** A variety of sub surface and surface explosive devices like land mines, unexploded ordnance, improvised explosive devices etc are likely to be encountered during conflict. These devices have the potential to cause delay and / or damage to own forces. There is a need to find a means to enable remote and accurate detection of these mines and other hazardous explosives in a speedy and safe manner.
  - (c) **How it was Being Overcome.** Mines / explosives ordnance are primarily being detected by in service equipment that include mine detectors, Explosive Vapour Detectors, Non Linear Junction Detector, Sniffer Dogs, Remotely Operated Vehicles etc all of which are ground based. No solution exists for aerial detection of mines/ordnance explosives.
  - (d) **Any Innovations to Locally Overcome the Problem.** Nil
5. **Who has the Problem?** The challenge is faced by all who are present in the vicinity of such explosive devices and therefore this problem is faced by the entire ground forces.
6. **Why is it Important to Solve?** It is important to solve as detection of the explosive device will not just enable speedy movement which is essential but also ensure minimizing of casualties due to these explosive devices.
7. **Contemporary Solution by Other Countries / Organisations.** Existing technology / solutions do not provide means to detect these explosive devices in a totally safe, fool proof and speedy manner. Most of the detection equipment currently available are ground based and require the operator and / or the equipment to come in close proximity of the explosive device, which endangers the operator and / or the equipment. Further, the process is time and resource intensive. An aerial system will overcome the present challenges, thereby providing a significant advantage.

8. **Point of Contact.**

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**PROBLEM STATEMENT – 148****PORTABLE HELIPAD**

1. **Short Title.** Material / process for fast construction of temporary helipad / Forward Area Rearing and Replacement Points.
2. **User Directorate(s).** Combat Engineers Directorate.
3. **Type of Problem.** Relates to value addition to existing material being used for construction of temporary helipads commensurate to advanced metallurgy / polymer technology.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** There is a need for light weight, durable, modular and easy & quick to lay materials for construction of temporary helipads.
  - (b) **Evolution of the Problem.** In service equipment such as neoprene membranes / Assault Track Way Class-12 rolls have traditionally been used for construction of helipads for the Chetak / Cheetal Class of helicopters. With the induction of Advanced Light Helicopters Class Helicopters, the rotor down wash has increased significantly. As a result, existing neoprene membranes are no longer suitable for employment. Consequently, for Advanced Light Helicopters (ALH) and Attack Helicopters, Assault Track Way Class-30 rolls are used for construction of a Helipad. The construction of helipads with Assault Track Way is an extremely tedious and time consuming process which also results in diversion of scarce track laying material from other operational tasks.
  - (c) **How it was Being Overcome.** Construction of temporary helipad was being done by utilizing in service Assault Track Way Class -12/Class-30 and neoprene membranes.
  - (d) **Any Innovations to Locally Overcome the Problems.** Minor changes in drills/methodology of transporting and laying the track material have been improvised at unit level. However, the material itself being bulky and cumbersome, the changes have not substantially reduced construction timings or facilitated ease in laying.
5. **Who has the Problem?** While ensuring mobility for own forces is a task of the Corps of Engineers, speedy mobility as well as logistic sustenance is a challenge for the Indian Army as a whole. The problem has risen due to non-availability of light weight, durable, modular and easy & quick to lay materials/technology for construction of temporary helipad and Forward Area Rearing and Replacement Points with the field formations.

6. **Why it is Important to Solve?** It is imperative to solve the problem because use of the third dimensioned aerial assets by the Army has grown manifold and continues to grow with the induction of helicopters for various purposes (reconnaissance, fire support, casualty evacuation, logistic sustenance etc). In addition, the use of drones and Unmanned Aerial Vehicles too has grown exponentially. Under field / combat conditions there is a need to construct helipads and Forward Area Rearing and Replacement Points for specific durations of the operations at multiple locations in restricted timeframes.

7. **Contemporary Solution by Other Countries / Organisations.** Globally nations are taking recourse to a 'mix and match' of rubber / polymer based fabrics and metal composites that are light weight and foldable.

8. **Point of Contact.**

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**PROBLEM STATEMENT - 149****ADDITIVE FOR DIESEL AT HIGH ALTITUDE AREA (HAA)**

1. **Short Title.** Additive for Diesel at High Altitude Area for Indian Army.
2. **User Directorate(s).** Pan Army.
3. **Type of Problem.** Unsolved Problem.
4. **What is the Problem (Need).**
  - (a) **Statement of Problem.** At high altitudes the diesel being used in vehicles/ equipment tends to freeze and there is a requirement to switch over to Diesel High Pour Point (Winter) & Diesel High Pour Point (Sub Zero) for smooth operation of vehicles / equipment. There is a requirement to develop an additive so that diesel could be used at places where Diesel High Pour Point (Winter) {10° C to (-) 18° C} & Diesel High Pour Point (Sub-Zero) {(-) 18° C to (-) 40° C} is being used.
  - (b) **Evolution of Problem.** There is a requirement to withstand sub-zero temperature at high altitudes which necessitates mixing of additives to diesel to increase antifreeze property.
  - (c) **How it was being Overcome.** By using Diesel High Pour Point (Winter) and Diesel High Pour Point (Sub-Zero).
  - (d) **Any Innovations to Locally Overcome the Problem.** Nil.
5. **Who has the Problem?** All forces deployed in HAA.
6. **Why is it Imp to Solve?**
  - (a) To have a single additive for diesel in HAA and ensure serviceability of vehicles and equipment at subzero temperature.
  - (b) To ensure smooth replenishment of fuel at high altitudes.
7. **Contemporary Solution by Other Countries / Organisations.** Our country has peculiarity of such extreme temperature variation therefore, there is a requirement to develop a single additive which can function effectively in extreme cold climatic conditions.

8. **Point of Contact.**

(a) **Primary Contact.**

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(b) **Secondary Contact.**

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**PROBLEM STATEMENT – 150**

**FIRE FIGHTING SYSTEM IN HIGH ALTITUDE AREA (HAA)**

1. **Short Title.** Requirement of Fire Fighting Measures in HAA.
2. **User Directorate(s).** Ordnance Services Directorate.
3. **Type of Problem.** Unsolved.
4. **What is the Problem (Need)?**
  - (a) **Statement of Problem.** The provision of fire fighting in the ammunition echelons located in HAA is based on the existing Static Water Tanks (SWTs). The water from these SWTs is pumped using portable fire pumps, however, due to the inclement weather and extreme cold climate, the water freezes and a layer of ice is formed above the water of thickness upto 500mm.
  - (b) **Evolution of Problem.**
  - (c) **How it was Being Overcome.** To obviate the problem, antifreeze solutions are used. However, the same have not been successful due to large volume of water involved. CFEES had earlier tried to construct underground SWTs with Aluminum & Glass Wool Cladding, However, the same were found effective only till 10,000 ft & temperature of minus 1°C.
  - (d) **Any Innovations to Locally Overcome the Problem.** Nil.
5. **Who has the Problem?** Ammunition points (APs) of units in HAA are adversely affected due to freezing of water in SWTs during the winter season.
6. **Why is it Important to Solve?** Ammunition points holds ammunition in large quantities. In order to contain the fire hazard, it is essential that immediate Fire Fighting actions are taken, however due to the freezing of the stored water, breaking up of the top layer of ice is cumbersome and entails delay. Local arrangements and modifications attempted in the past in conjunction with CFEES and MES to resolve the problem have not been successful.
7. **Contemporary Solution by Other Countries / Organisations.** Not known.

8. **Point of Contact.**

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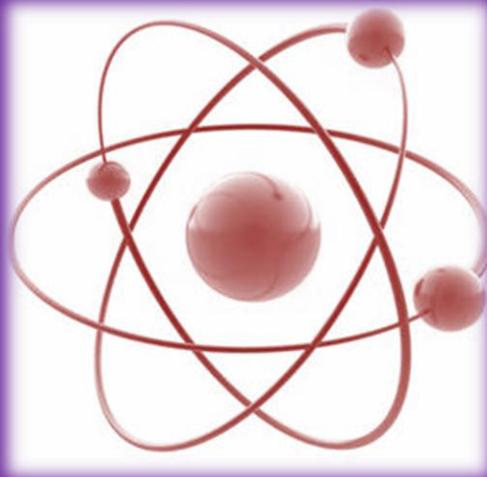








INDIGENOUS SOLUTIONS TO FIGHT FUTURE WARS



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