



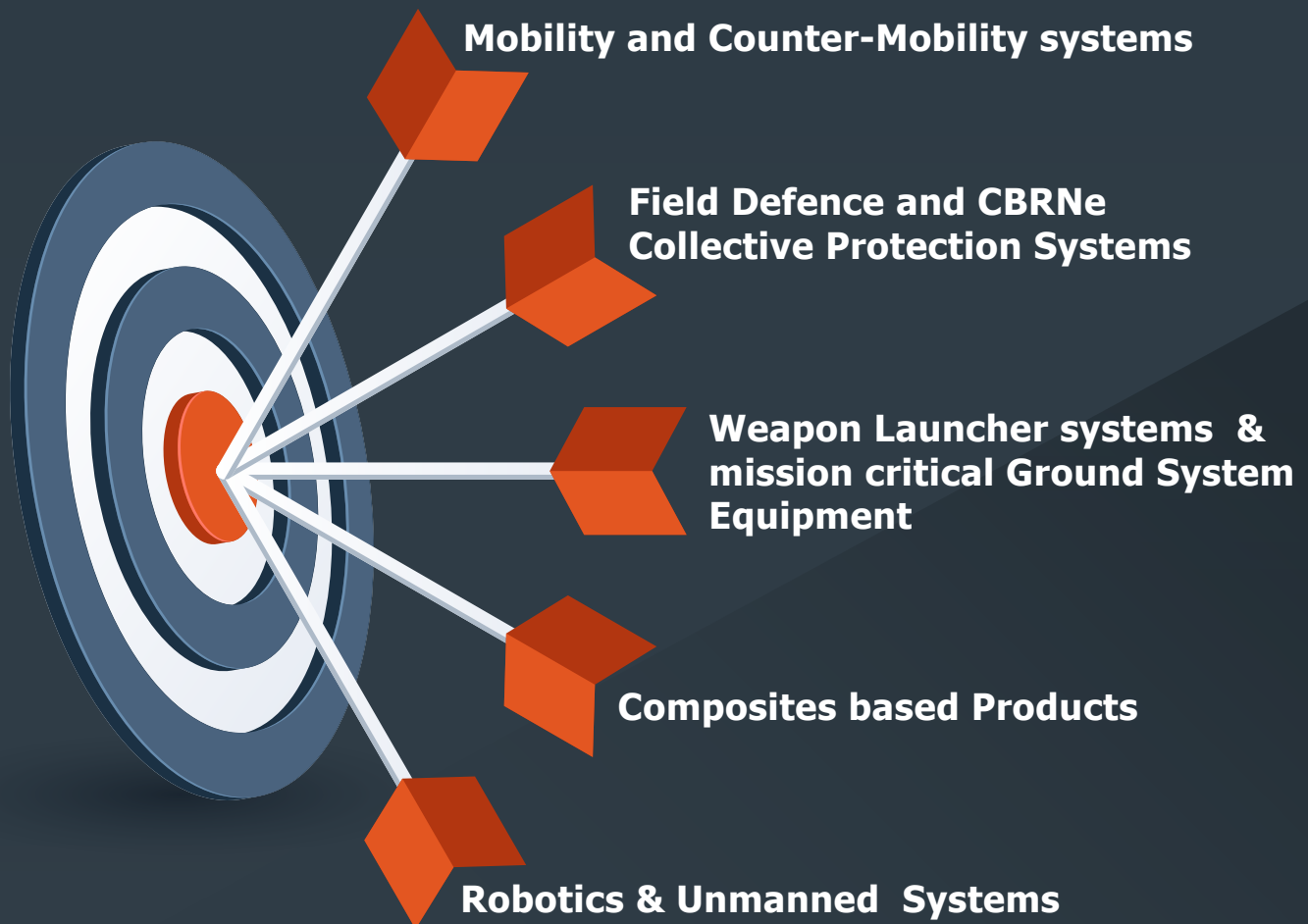
# R&DE (E)

Research & Development Establishment  
(Engineers)



## About Lab

- ❖ Research & Development Establishment (Engineers), Pune traces its origin to the Inspectorate of Engineer Stores set up at Kolkata during World War II
- ❖ Later amalgamated with Chief Inspectorate of Mechanisation at Chakala in 1946.
- ❖ After partition, this Inspectorate shifted to Ahmednagar and was designated as Technical Development Establishment Vehicles (TDEV).
- ❖ R&DE (Engrs) was established at Dighi in Pune on 09th Feb 1962 for design and development of equipment for the Corps of Engineers (Celebrating Diamond Jubilee)
- ❖ R&DE(Engrs.) is a premier engineering systems laboratory of DRDO with a mandate to support Indian Armed Forces in the following areas:



## Aircraft Store Release and Ejection Mechanism (ASREM)

Aircraft Store Release and Ejection Mechanism facilitates the suspension and release of aircraft stores during various flight conditions. ASREM is configured for aircraft stores having standard lugs 14inch apart. ASREM is provided with positive lock for ground operation and has got features for manual operation. The mechanism of ASREM ensures the synchronous motion of two hooks during release of store. ASREM is currently designed for store up to 125 Kg, but can be reconfigured for higher weight stores.



Two telescopic ejectors of ASREM, imparts the ejection velocity up to 8m/s and also has pitch up or pitch down release option. Four sway braces on ejector housing ensures the tri-axial constraint on the store. High Pressure pneumatic system is used for actuation of ASREM, which requires very low maintenance

### Salient Features

- ASREM: weight 10Kg, Designed as per MIL-STD -8591.
- Energy source: Cold gas cartridge / High pressure pneumatic system
- Long Ejection stroke with ejection velocity (up to 7 m/s) and pitching option
- Compatible for store with 14" lug spacing (Nato Std)
- Manual sway-bracing
- ASREM may be integrated to bomb bays, Pylons & fuselage stations

## Aircraft Store Release & Ejection Mechanism ASREM-5332C

ASREM facilitates the suspension and release of aircraft stores during various flight conditions. ASREM is configured for aircraft stores having both standard lugs spacing 14 and 30 inch apart. ASREM is provided with positive lock for ground operation and has got features for manual operation.



ASREM is designed for store up to 650 Kg, but can be reconfigured for higher weight stores. Two telescopic ejectors of ASREM, imparts the ejection velocity up to 3 - 7 m/s and also has features for imparting pitching. Four sway braces on ejector housing ensures the tri-axial constraint on the store. Pyro Cartridge is used for actuation of ASREM.

## Salient Features

- ASREM: weight 25Kg, Designed as per MIL-STD -8591.
- Energy source: Pyro cartridge ERU-201
- Long Ejection stroke with selectable ejection velocity (up to 7 m/s) and pitching option
- Compatible for store with both 14" & 30" lug spacing (NATO Std)
- Manual sway-bracing
- ASREM may be integrated to bomb bays, Pylons & fuselage stations

## Quick Release Mechanism (QRM)

QRM is aircraft store launcher for internal weapon bay application. QRM facilitates the suspension and release of aircraft stores. QRM is configured for aircraft stores having standard lugs 14inch apart and weight up to 190Kg. QRM consists two telescopic ejectors which imparts the ejection velocity up to 8.2m/s and also has pitch up or pitch down release option. QRM is provided with straight line lowering mechanism to lower the suspension and release mechanism (S&RM). S&RM hold the stores and apply the tri axial constraint through four sway braces, till store clears the bay area. S&RM is actuated by small drift of lowering mechanism, which release the store. High Pressure pneumatic system is used for actuation of QRM, which requires very low maintenance.



## Salient Features

- QRM: weight 10Kg, Designed as per MIL-STD -8591.
- Energy source: High pressure pneumatic system
- Tri axial constraint till store clears the bay area
- Long Ejection stroke with ejection velocity (up to 8 m/s) and pitching option
- Compatible for store with 14" lug spacing (Nato Std) & Manual sway-bracing
- Total operation time is less than 0.1sec



## Rudder Pedal

Rudder Pedal facilitates the directional control to the aircraft about its vertical axes by moving the both pedals differentially which in turn rotates rudder control surfaces respectively. It also facilitates the airbrake by pushing both the pedals forward simultaneously which causes rudder surfaces to move inwards to act as an airbrake. Rudder Pedals are

fitted on the bottom front end of cockpit floor. Displacement of Pedal are measured using Quadruple LVDTs. Passive Artificial Feel Unit is provided to give the feel force to the pilot.



## Salient Features

- Passive Artificial Feel Unit with Quadraplex LVDTs for Rudder and Braking operation.
- Floor mounted with pedal adjustment of between 0 to 150 mm.
- Designed with quadruple redundancy
- Designed for 8 million cycles
- Hydraulic damper to be provided to suppress undesirable vibrations of the pedal to achieve the dead beat centering

## Control Stick

Aircraft motion is controlled by Pilot through Pilot stick which provides the longitudinal control (pitch movement) and lateral control (Roll movement) of the aircraft which is fitted near the pilot seat. The pilot controls pitch angle of aircraft with forward and aft movement of the pilot stick and Roll motions of the aircraft with left and right movement of the pilot stick. These commands given to the aircraft through quadruple LVDT output to DFCC (Digital Flight Control Computer) to control surfaces. This is a passive control stick

## Salient Features

- Passive Control Stick having two axis gimbals with Artificial Feel Unit
- Designed with quadruple redundancy
- Designed for 8 million cycles
- Hydraulic damper to be provided to suppress undesirable vibrations of the pedal to achieve the dead beat centering.
- Weight of Pilot stick is 7 kg



# Modular Bridging System

Modular Bridge is a mechanically launched single span mobile bridging system. It is used to traverse a trench/river gap in the path of the moving platoon/regiment if the need arises. It is designed to support crossing over of tracked and wheeled vehicles up to MLC 70 load class. It can be used for deploying across gaps of varying lengths as required from 14m to 46m in steps of 6.5m. It will provide a safe 4m roadway passage for traffic across gaps and trenches with transportation width of 3.5m.

The Modular Bridge system mainly consists of launching system mounted on 10X10 High Mobility Vehicle (HMV) and carrier vehicle (8X8 HMV) for transporting the Nose and Bridge modules.

The bridging components are lifted and assembled at site by a Material Handling Device (Crane) inbuilt in the launching system. A single span bridge of 46m is constructed in 90 minutes with 6 + 1 crew members. The major advantage of this system is its modular design, which enables the bridge to be deployed in different lengths.



## Salient Features

- › Mechanically launch bridge with 06 + 01 crew.
- › Variable spans from 14m to 46m in steps of 6.5m.
- › Single span fully decked antiskid roadway width of 4m.
- › Military load class MLC-70 for both tracked and wheeled vehicles.
- › Launching System mounted on 10x10 HMV.
- › Carrier vehicles (8x8 HMV) for transporting Nose & Bridge components
- › Launching /Retrieval from either bank.
- › Launching time 90 minutes in day time & 120 minutes in night.

## SARVATRA Bridging System

Sarvatra Bridging System is one of the longest multi span bridging system in the world. With individual span of 15m each, a class 70 bridge upto a span of 75m can be constructed using 5 spans. Being class 70, the system is capable for most of service vehicles including MBT Arjun. Each span of the bridge can be deployed mechanically in less than 20 minutes by a crew of 5. System is highly versatile and can be used for variety of bridging applications for spans varying from 15 to 75m. Spans are connected through telescopic piers which can vary in height from 2.5m to 6m



## Salient Features

- Carrier vehicle - TATRA 815 VVN 8X8
- re-engineered
- Bridge span -15m
- Multi span capability - 75 m
- Load class - MLC 70
- Road way width - 4m
- Obstacle depth - 2.5 to 6 m
- Soil bearing capacity - 2 kg/cm<sup>2</sup>

## Trawl Assy for T-72/T-90 Tanks

The main function of Trawl assembly is to create Assault/ Vehicle Safe Lane (VSL) through minefields. One set of trawls will be mounted on one T-72/T-90 tank. Four set of trawls mounted on four T-72/T-90 tanks could be used in tandem to create a VSL of width not less than 5.39 meter. The equipment is employed in plains, semi-deserts and desert terrain.





## Salient Features

- › The trawl assembly is capable of being mounted on T-72/T-90 tanks as available with the Indian Army.
- › The trawl assembly creates VSL of 5.39 m by using 4 trawl tanks in tandem.
- › Trawl assembly able to provide two clear tread ways of width not less than 0.8 m each, through minefield, in a single pass.
- › 90% mine clearance in single pass
- › The trawl assembly is able to withstand upto four explosions of an anti-tank mine with explosive content not more than 7.5 kg of TNT.

## SUMITRA

SUMITRA is an intelligent perimeter surveillance system aimed at augmenting the existing perimeter security apparatus with enhanced sensors, automated alarm generation and better situational awareness to reduce operator fatigue and false alarms. The system is further



augmented with fully automated real-time intruder tracking using Unmanned Aerial Vehicles (UAVs). Being an indigenously developed system, it is aimed at removing dependence on foreign solutions thereby ensuring secrecy of our vital establishments.

## Salient Features

- › Intelligent Intrusion Detection using multiple types of sensors
- › AI based Classification & Recognition of Intruders
- › Tracking of Intruders by Unmanned Aerial Systems
- › Distributed & Open Architecture catering to scalability & modularity
- › Identification of Friend or Foe to differentiate our own security patrols from intruders
- › Aerial Threat Detection System for identifying incoming rouge aerial threats (UAVs)
- › Summarization & Post Analytics
- › Field Operation Capability
- › Indigenous AI & Software to reduce dependency on foreign OEMs



## QRSAM Launcher

The QRSAM Weapon System is a Quick Reaction Missile System capable of Surveillance, Target Acquisition, Tracking while on the move and fire on short halts for an Area Air Defence being developed by DRDO



## Salient Features

- › All Round Missile Firing Capability in elevation from 10 to 60° and Azimuth 360 °
- › Quick Deployment and Launching of the Canisterised Missiles from uneven grounds
- › All Weather Condition and Day Night Operation
- › High Slewing & Tracking Rates with precise positioning
- › Automatic High Speed Deployment System
- › Cross Country Mobility & Transportation by Air, Rail Road &Ship
- › Multi-axis closed loop servo control
- › Multiple High Speed Actuator Synchronization
- › System Ruggedisation &Integration

## Akash NG

The AKASH-NG (AKNG) Weapon System is being developed by DRDO for Indian Air Force. The weapon system is capable of engaging multiple targets (10 targets) simultaneously with 360° coverage in azimuth. AKASH-NG MLS is a trailer mounted system hauled by 6x4 Prime Mover for launching AKASH-NG missile. The MLS houses the up to six (6) Canisterised Missiles



(CMs), platform levelling system, Elevation and Azimuth system, Launcher and Missile electronics, Communication and other necessary equipment. A single trailer carries the entire Launcher System including its captive Power Supply System housed on an Underframe. The key launcher operations and functions including missile launch is controlled by CCU which communicates with MLS through a wired / wireless communication system at a distance up to 2 km away from the MLS

## Salient Features

- › Electrically Synchronized twin roller screw
- › Indigenous 128 Channel Slip Ring with max power of 40kW
- › Embossed type easy to manufacture canister
- › 20° to 70° Elevation and all 360° azimuth firing
- › Slant Rang upto 30 Km
- › Altitude 30m to 14 Km

## High Payload Multi Copter

Untethered Multi-copter Payload 5kg is a high payload multi-copter with on-board Li-ion battery bank. Advantage of Untethered multi-copter is that it has high payload capacity and endurance of 30min. This Untethered multi-copter can carry out autonomous missions with waypoint navigation up to 5km. It has feature of payload release. So it can travel to designated location in auto mode and release payload and return to home location



## Salient Features

- › UAV : UT1
- › Multi-copter : Quad-copter
- › Payload : 5 kg
- › Endurance : 30 min
- › Range : 5km
- › Lateral Speed: 6 to 8 m/s
- › Altitude (AGL): 200 m
- › Operation Altitude (MSL): 3000 m

## Surveillance ROV

Surveillance ROV (SROV) is designed with multi-role capability for counter terrorist applications. SROV is a man portable tracked platform that can perform advance party roles and provides real time video feedback.



## Salient Features

- › Range :200m LOS
- › Endurance:2 hrs
- › Payloads
  - Water Jet Disrupters
  - Charge Dispenser with remote initiator
  - Pistol (9mm)
  - Under vehicle scanning (UVS)
  - Pan Tilt Unit with Zoom camera
- › Command & Control:Remote operation through RF link
- › Vision:Multiple cameras with day and night capability
- › Stair Climbing capability:up to 35 degree slope/stair
- › Master Control Station: Backpack based

## Confined Space ROV

The Confined Space Remotely Operated Vehicle (CSROV) can traverse through confined spaces within train compartments and aircrafts. It can reach and extract suspected baggage from all corners of train compartment or overhead cabin storage space inside aircrafts



## Salient Features

- › Range of Operation : 200 m LOS
- › Endurance : 2 hrs
- › Manipulator reach : 2 m vertical,1m horizontal
- › Degrees of Freedom at manipulator arm : 06
- › Handling capability : 8 kg at full extension
- › Payloads:Recoilless Water Jet Disrupter
- › Command & Control: Remote operation through RF/FO
- › Video : Real Time RF/FO Transmission
- › Vision : Multiple day/night cameras
- › Master Control Station : Backpack based



# R&DE (E)

Research & Development Establishment (Engrs.)

Alandi Road Dighi, Pune - 411015