



DEFENCE LABORATORY JODHPUR

▣ ABOUT THE LAB

Defence Laboratory, Jodhpur, (DLJ) is a certified ISO 9001:2015 Laboratory under the NS&M cluster of DRDO, and is pioneer of Research & Development in Critical Technologies and Products for Combat Survivability. The Lab was established on 16th May 1959 with a focus on developing technologies and products oriented to solve the problems faced by the troops operating in the Desert environment. Today, the Laboratory's key Technology verticals are (1) Camouflage and Low-Observability, (2) Decoys and Countermeasures, (3) Nuclear Radiation Management, and (4) Desert Operations Support. The Laboratory has developed Products and Technologies for Camouflage, Deception, and Low-Observability for use by the Services, and for Signature management of various Platforms under Development. Critical Technologies pertaining to Chaff Countermeasures have been developed, productionized, and introduced into the Indian Navy and Air Force. Under the charter of Nuclear Radiation Management, many nuclear radiation sensors, contamination monitoring Systems, and Surveillance Systems have been developed at DLJ, and introduced into the 3 Services. Desert Operations Support Technologies address Heat Management, Water Purification, Visibility, and Soil Stabilization. The Laboratory's work in these domains is supported by State-of-the-art Facilities and Test Infrastructure.



Chaff Cartridge-118/I is a passive electronic counter-measure to protect Aircrafts from RF seeker missiles in the microwave frequency range. It is a non-metallic rectangular container filled with millions of chaff fibers of different cut off lengths. DLJ has designed and developed advanced chaff cartridge having efficient chaff material and innovative payload design

Salient Features :

- Contains very fine conducting fibers
- High RCS for broadcast frequency coverage
- High retention time for chaff fibers
- Rapid dispersal bloom rate
- Cost effective manufacturing process
- High operation life

Short Range Rocket (SRCR)

The Indian Navy Anti- Ship Missile Defence System

consists of three variants of Chaff Rockets viz: Short

Range Chaff Rocket (SRCR),

Medium Range Chaff Rocket

(MRCR) and Long Range Chaff

Rocket (LRCR). Defence Labora-

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nously developed this critical

tecnology namely, Long Range

Chaff Rocket (LRCR) meeting

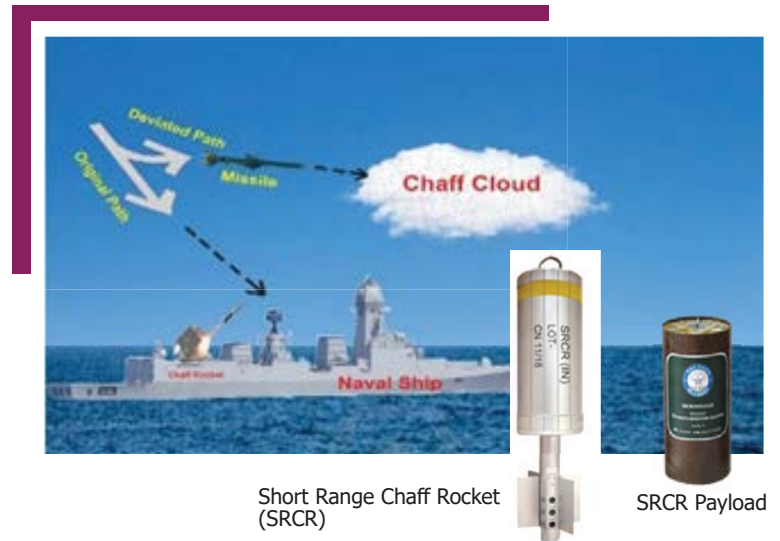
Indian Navy's qualitative require-

ments. The successful develop-

ment of Advance Chaff Technolo-

gy by DLJ is another step

towards Atmanirbhar Bharat



Salient Features :

- SRCR is a mortar launched centre burst system and is intended for the seduction role.
- In Seduction mode, once the missile is locked on, chaff is fired at short ranges (less than 1 km).
- The ship's jammer misleads the missile on to the chaff and when jamming ceases, the missile homes onto the chaff decoy.

Medium Range Rocket (MRCR)

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Medium Range Chaff Rocket (SRCR)



MRCR Payload

The Indian Navy Anti-Ship Missile Defence System consists of three variants of Chaff Rockets viz: Short Range Chaff Rocket (SRCR), Medium Range Chaff Rocket (MRCR) & Long Range Chaff Rocket (LRCR). Defence Laboratory Jodhpur(DLJ), has indigenously developed this critical technology namely, Medium Range Chaff Rocket (MRCR) meeting Indian Navy's qualitative requirements. The successful development of Advance Chaff Technology by DLJ is another step towards Atmanirbhar Bharat.

Salient Features :

- MRCR is a rocket launched piston-based system & is intended for the distraction role. In distraction mode, when the
- enemy has detected the ship and a missile attack is imminent, chaff is fired at shorter ranges (1-2 km) in order to mislead the missile radar when it starts transmitting.
- The chaff cloud's radar cross-section need only be comparable to the ship in this mode.

Long Range Rocket (LRCR)

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Long Range Chaff Rocket (SRCR)



LRCR Payload

The Indian Navy Anti- Ship Missile Defence System consists of three variants of Chaff Rockets viz: Short Range Chaff Rocket (SRCR), Medium Range Chaff Rocket (MRCR) and Long Range Chaff Rocket (LRCR). Defence Laboratory Jodhpur(DLJ), has indigenously developed this critical technology namely, Long Range Chaff Rocket (LRCR) meeting Indian Navy's qualitative requirements. The successful development of Advance Chaff Technology by DLJ is another step towards Atmanirbhar Bharat.

Salient Features :

- LRCR is a rocket launched piston-based system and is intended for the long- range confusion role.
- In confusion mode, chaff is fired at long range (upto 10 km) when the ship is outside the range of enemy search and target indication radars.
- This tactic provides a large number of false targets that is indistinguishable from the real ship

Medium Range Microwave Obscurant Chaff Rocket (MR-MOCR)

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In a technology breakthrough DLJ has developed Microwave Obscurant Chaff (MOC) which obscures radar waves in wide frequency range by 10-15 dB. Microwave Obscurant Chaff technology will be utilized to safeguard the strategic defence platforms/installations of Indian Armed Forces by creating a radar low penetrable screen/shield and increase their survivability against enemy threats having radar capabilities. DLJ has developed initial prototypes of Medium Range-Microwave Obscurant Chaff Rockets (MR-MOCR) for integration with Indian Navy's Kavach Decoy System for safeguarding IN war platforms from enemy radars and RF seeker missiles. And may be used to create safe corridor within enemy territory.



Salient Features :

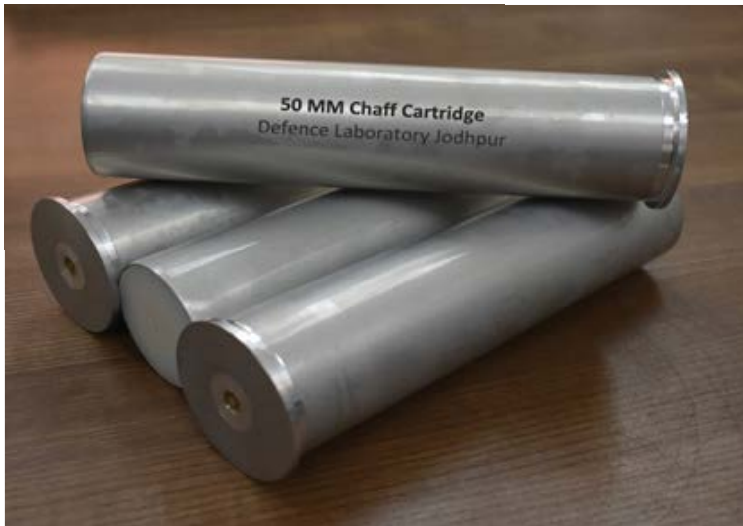
- High Signal Absorption and scattering of incident radiations in microwave and millimetre waves.
- Wide Frequency Range



26mm chaff cartridge is a passive electronic counter-measure to protect Aircrafts from RF seeker missiles in the microwave frequency range. It is a cylindrical container filled with lakhs of chaff fibers of different cut off lengths.

Salient Features :

- Contains very fine conducting fibers
- High retention time for chaff fibers
- Rapid dispersal bloom rate (<200ms)
- Cost effective manufacturing process
- High operational life & shelf life



50mm chaff cartridge is a passive electronic counter-measure to protect Aircrafts from RF seeker missiles in the microwave frequency range.

It is a cylindrical container filled with millions of chaff fibers of different cut off lengths.

Salient Features :

- > Contains very fine conducting fibers
- > High RCS for broadband frequency coverage
- > High retention time for chaff fibers
- > Rapid dispersal bloom rate (<200ms)
- > Cost effective manufacturing process
- > High operational life and shelf life

Emergency Sea Water Purification Kit

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Sea Water Purification Kit is capable to convert 500 ml Sea water into drinkable water with in short period of 30 minutes. Kit is capable to remove colour, odour, turbidity, high TDS & microbial contaminants from sea water. It is light weight, foldable, simple to operate, compact & no need of electrici-



Salient Features :

- The kit is capable to remove all contaminants of sea water by prepared materials and filtration technique
- The kit can be used after replacement of material
- Compact, foldable, keep in pocket
- No need of electricity and pump
- Easy to operate
- Light weight (approx. 240 gm)

Virtual Reality Based Airborne Chaff Simulator (VIRAT)


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Airborne Chaff is an important strategic countermeasure device used worldwide to protect Military Aircrafts & Ships from enemy radar & RF seeker missiles. Defence Laboratory has successfully developed indigenous airborne chaff material. Defence Laboratory, Jodhpur has established a **'Virtual Reality based Airborne Chaff Simulator'** for the simulation of real time warfare scenarios by firing chaff cartridges for deceiving the incoming hostile RF seeker missiles & safeguarding the Fighter Aircrafts.



Salient Features :

- > Contains very fine conducting fibers
 - > High RCS for broadband frequency coverage
 - > High retention time for chaff fibers
 - > Rapid dispersal bloom rate (<200ms)
 - > Cost effective manufacturing process
 - > High operational life and shelf life
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X-Band Radar Absorbing Paint

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RAP coated Objects

Defence Laboratory, Jodhpur has developed Radar Absorbing Paint System for airborne strategic objects such as glider bomb, manned fighter, surveillance aircraft and unmanned aerial vehicles to reduce Radar Cross Section (RCS) of objects. The application of the paint on to selective locations decreases detectability of objects tracked by enemy radars and increases the survivability of the objects.



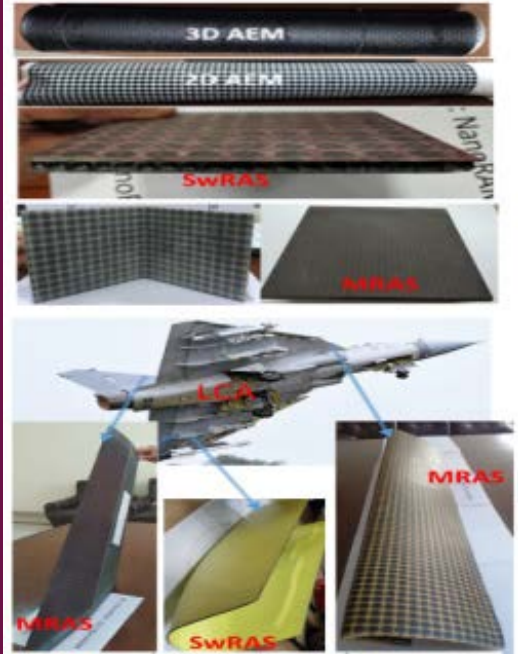
RAP coated on different geometries

Salient Features :

- | | |
|------------------------|-----------------------|
| • Thermal Stability | -55oC to 160oC |
| • Thickness of Coating | 1.7±0.1mm |
| • Curing | Room Temperature |
| • Density | 1.7g/cc |
| • Wt. Penalty | 3.0 kg/m ² |
| • Recoat Time | 30 minutes |
| • Base Substrates | Metal/FRP Composites |
| • Application Method | Spray Coating |

Artificially Engineered Material (AEM) based RADAR Stealth

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A Stealth technologies are required in a major way for country's ongoing projects on combat aircraft and Crucial to attain indigenous capability in field of stealth technologies. Artificial EM (AEM) materials with engineered and controllable electromagnetic properties enabled unique opportunities in the realization of state-of-art radar absorbers.

Salient Features :

- Capabilities to design and practical realization of AEM based Absorbers in accordance with the functional, structural and environmental constraints
- Sandwich Radar Absorbers
- Monolithic Radar Absorbers (MRAS)
- Flexible Radar Absorbing Sheets (FRAS)
- Broad bandwidth
- Negligible impact on structural properties of composites
- Amenable to fabrication using standard prepreg layup techniques for aircraft structures

THERMAL TARGET SYSTEM

Thermal Target of a soldier



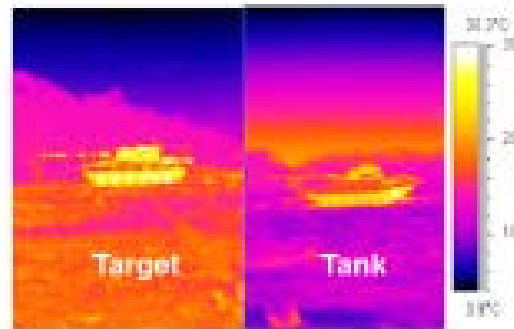
Visual Image



IR Image of Soldier Target



Visual Image of Broad-view TTS



IR Image of TTS and Tank

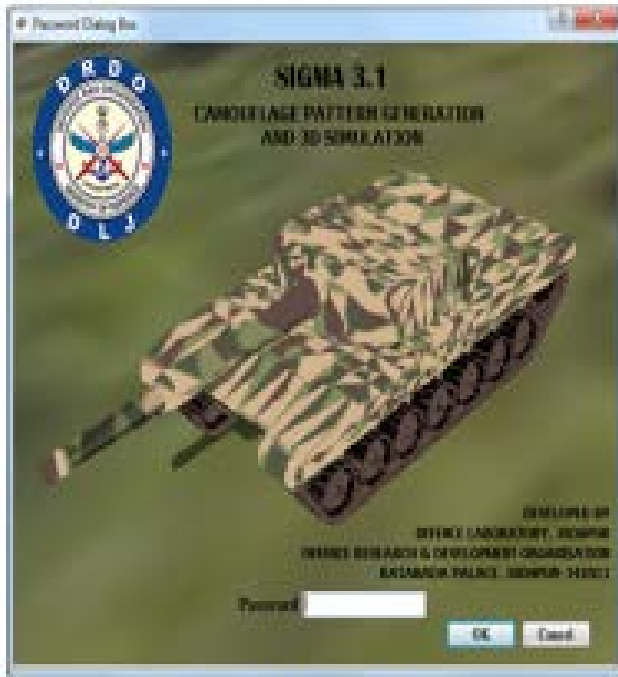
Defence Laboratory, Jodhpur has indigenously designed & developed Thermal Target System (TTS) for field evaluation of imaging IR based Anti Tank Guided Missiles (ATGM) like NAG, HELINA, DHURVASTRA, MPATGM. Thermal Targets are special class of infrared targets specifically tuned to provide simulated thermal profile equivalent to that of a combat tank in field. These Targets are appropriate & cost effective tool for testing of heat seeking missiles, considering the fact that firing practice trials of missiles cannot be carried out on to real objects but only on simulated one.

Thermal target of a soldier has also been developed which mimics the thermal signatures of an actual soldier and can be useful for various military applications

Salient Features :

- > Thermal signatures generation by surface resistive heating of thermally sprayed coating
- > Operational in 3-5 μm and 8-14 μm wavelength bands.
Light weight and portable structure for field use
- > Battery operated
- > Configured to any shape and size as per requirement to generate IR signature
- > Remotely controlled through wireless operation

Software for Camouflage Pattern Generation & 3D Visualisation



Sigma 3.0 login Window



Camouflage Patterns Developed Using Sigma 3.0

Software Sigma 3.0 has been developed for camouflage pattern design as per requirement of Services. This software can generate a large variety of camouflage patterns depending upon terrain features and user specification.

- Camouflage patterns are designed depending on the prevailing terrain features
- Important pattern parameters viz. color percentages, shapes, size, smoothness etc
- Based on guidelines issued by Inter Services Camouflage and Deception Committee Interactive visualization of Military Asset with Generated Pattern in 3D

□ Salient Features :

- > Unified single user interface with user friendly GUI
- > 3D Visualization of camouflage patterns and linked 2D profile with lighting and shadow casting effects
- > Background matching using multiple background images
- > Pattern and Object size measurement in real units i.e. mm, cm, inch, foot or meter
- > Additional & Advanced Camouflage Patterns

PORTAL MONITORING SYSTEM (PMS)

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The PMS is used for rapid screening of personnel with respect to gamma radiation contamination during routine monitoring and nuclear/radiological emergency. The system can also be used for detection of illicit movement of radioactive material.

Salient Features :

- Detector: Plastic scintillator sensor rods
- Unique three limbs design
- Bi-directional passage provision
- Integrated camera for image capturing
- Remote base station with data acquisition system
- Modular, quick & easy set-up
- Noncorrosive material
- Adaptable as vehicle monitor
- EMI/EMC Compatible as per MIL STD 461E
- Environmentally rugged as per JSS 5555 Mains as well as battery operation for 8 hours



PORTAL MONITORING SYSTEM

CONTAMINATION MONITORING SYSTEM – LINEN (CMS-Linen)

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CONTAMINATION MONITORING SYSTEM – LINEN

CMS-Linen is used to detect radioactive contamination in linen articles. The system performs rapid screening of linens for gamma/beta contamination during routine contamination monitoring at nuclear facilities and during nuclear & radiological emergency scenario.

Salient Features :

- Detector: Plastic scintillator sensor sheets
 - PTFE mesh water resistant conveyor belt.
 - Auto segregation of contaminated & non contaminated linens
 - Non-corrosive mechanical frame
 - Carrying capacity of conveyor : 6 kg
 - Mains as well as battery backup for manual operation
 - EMI/EMC Compatible as per MIL STD 461E
- Environmentally rugged as per JSS 55555

CONTAMINATION MONITORING SYSTEM -TERRAIN (CMS-Terrain)

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CMS-Terrain is a mobile, fast and effective portable system for screening of large areas to detect gamma and beta surface contamination in nuclear facilities, trans-shipment points of radioactive waste container and during nuclear/radiological emergency scenario.



CONTAMINATION MONITORING SYSTEM – TERRAIN

Salient Features :

- Detector: Plastic scintillator sensor sheets
- Detection of beta and gamma contamination
- Adjustable detector height
- Noncorrosive material
- Mains as well as on battery backup for 12 Hrs
- EMI/EMC Compatible as per MIL STD 461E
Environmentally rugged as per JSS 55555



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