

# DIRECTORATE GENERAL OF MECHANISED FORCES



**MAKE CASES : DG MF**



# **MAKE IN INDIA**



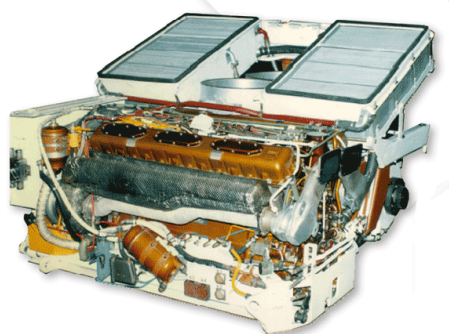
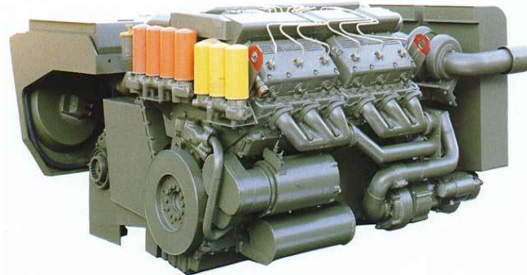
<u>Ser No</u>	<u>Scheme</u>	<u>MoQ</u>	<u>Recurring Reqmt</u>	<u>Update/ Status</u>
1	1000HP Eng with associated peripherals for T 72 Tanks & Variants	1000	200 Engs / Yr	<ul style="list-style-type: none"><li>• Draft PSQR Ready,</li><li>• Feasibility Study being constituted</li><li>• Vendor Interaction at ACCS</li><li>• Next Interaction in Sep 16</li></ul>
2	125mm SB Gun for T 72 & T 90 tanks with missile firing capability and Improved Amn (DoP $\geq 600\text{mm}$ )	1000	150- 200 Brls / Yr	<ul style="list-style-type: none"><li>• Scope of work defined</li><li>• Draft PSQR under prep</li><li>• Feasibility Study being constituted</li><li>• Vendor Interaction at ACCS</li><li>• Next Interaction in Sep 16</li></ul>
3	125mm APFSDS Improved Amn for T 72 & T 90 tanks with DoP $\geq 600\text{mm}$	20000	20000 Rds /Yr	<ul style="list-style-type: none"><li>• Draft PSQR ready</li><li>• Feasibility study being constituted</li><li>• Vendor Interaction at ACCS</li><li>• Next Interaction in Sep 16</li></ul>



# **MAKE PROJ : DGMF**



## **1000 HP Engine with associated peripherals for T 72 Tanks & Variants**



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Pin 110001**





# 1000HP ENG FOR T 72 TANKS



## SCOPE

Aim to achieve min 1000 HP and  
Power to Wt ratio of min 20 HP/Ton.

### Dvr Controls & Starting Sys :

Digital Displays & Alarm Sys Integ

### Electrical Sys :

No Change

### Cooling & Lubrication Sys :

Preferable to use existing  
T 90 Radiators/ Lubs

### Engine :

V 92S2 / 1000HP +

### Txn Sys : T 72/ T 90 (Standardisation (preferred) Upto final drive & Tracks

### Suspension Sys:

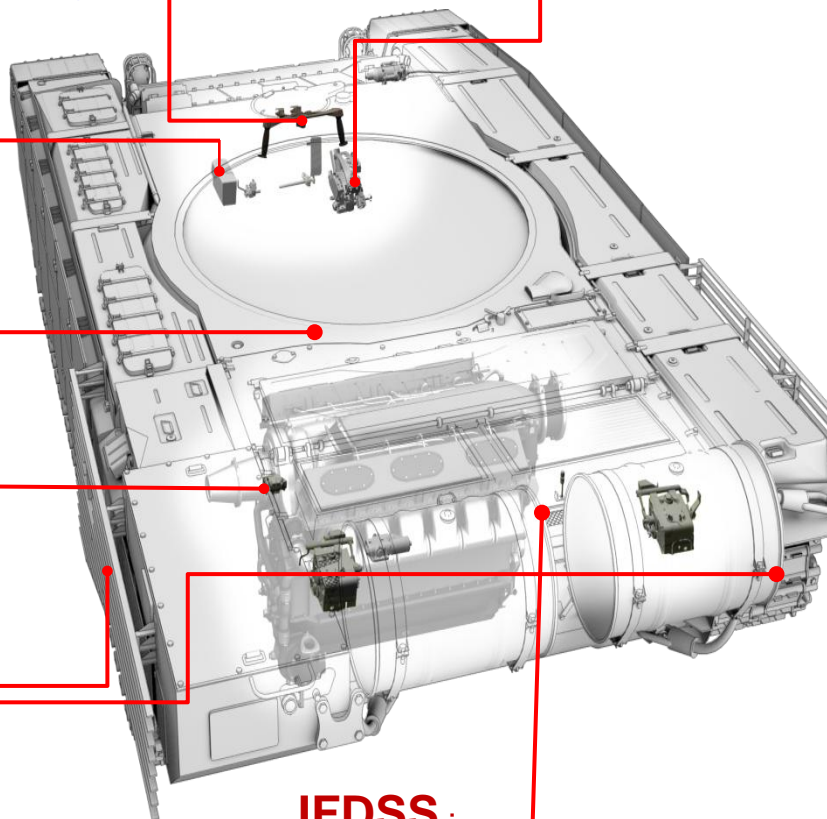
Min Change

### NBC Sys:

No Change

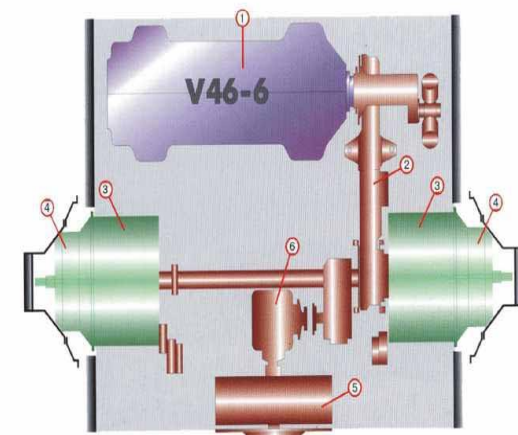
### IFDSS :

Existing Sys w/o change



## Challenges Involved :

- **Min 1000HP Eng** (at fry wh)
- Incl fit for variants (BLT/ Trawls/ ARVs) & with **min modifications**
- **Txn Sys, Cooling & Lub Sys** : Integration
- **Suspension Sys** : Min Changes
- **NBC & IFDSS Sys** : No Change Permitted
- **Elec Sys** : No Change





# 1000HP ENG FOR T 72 TANKS



## Status/ Update

- **Scope has been defined**
- **Draft PSQR ready**
- **Feasibility Study being Convened shortly**



## Industry Response

- **1<sup>st</sup> Interaction ACCS- Jul 16**
- **2<sup>nd</sup> Interaction – Sep 16 (2<sup>nd</sup> Week)**
- **Vendor Response :**
  - ✓ M/s Cooper Corpn Ltd
  - ✓ M/s Universal Tech Sys
  - ✓ M/s Greaves Cotton Ltd
  - ✓ M/s Virgo Industries Ltd
  - ✓ M/s Tata Power SED
  - ✓ M/s TATA Motors Ltd
  - ✓ M/s Techno Mechanical Service Pvt Ltd
  - ✓ M/s Shapoorji Pallonji & Coy Pvt Ltd
  - ✓ M/s L & T
  - ✓ M/s Kirloskar
  - ✓ M/s Ashok Leyland
  - ✓ M/s Kalyani Strategic System Pvt Ltd
  - ✓ M/s Bhilai Engg Corpn Ltd
  - ✓ M/s VM Corporate Service Pvt Ltd



# **1000HP ENG FOR T 72 TANKS**



## **BASIC QRs**

<b>Ser No</b>	<b>Parameter</b>	<b>Capability</b>
(i)	<b>Power</b>	• <b>1000HP +</b>
(ii)	<b>Power to Wt Ratio</b>	• Not less than <b>20 HP/Ton</b>
(iii)	<b>Fuel consumption</b>	<ul style="list-style-type: none"><li>• Severe Dunal Trn - 750 ltr <math>\pm</math> 10</li><li>• X-Country - 650 ltr <math>\pm</math> 10</li><li>• On Rd - 500 ltr <math>\pm</math> 10</li></ul>
(iv)	<b>Ambient Temp for Ops</b>	<ul style="list-style-type: none"><li>• All environment condition in sub continent as per JSS/Mil Stds.</li><li>• For evaluation 40°C to 45°C</li></ul>
(v)	<b>Life of Engine</b>	• 650 hrs (same as T 90- <b>V2S2 Eng</b> )



# 1000HP ENG FOR T 72 TANKS



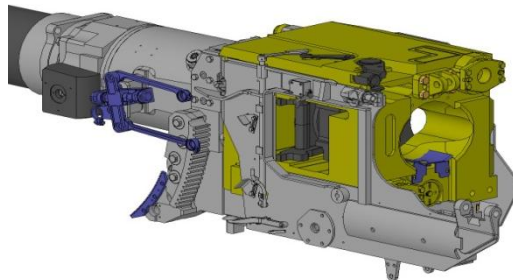
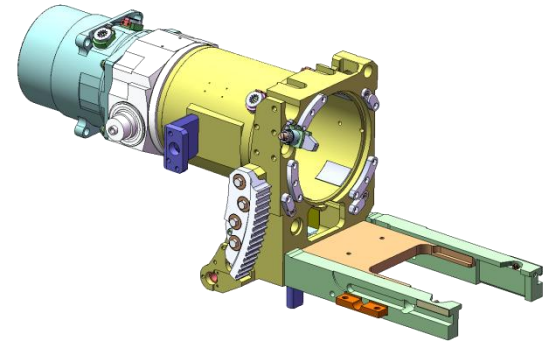
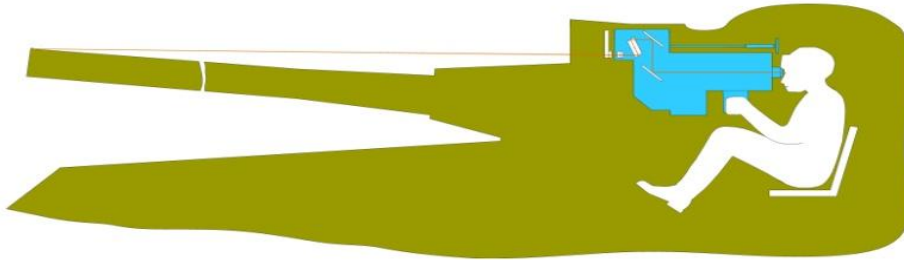
<u>S No</u>	<u>Next Action/ Steps</u>	<u>Remarks</u>
1	Feasibility Study	<ul style="list-style-type: none"><li>➤ To be convened shortly</li><li>➤ <b>Completed by Dec 16</b></li></ul>
2	Prep of PSQRs	<ul style="list-style-type: none"><li>➤ Simultaneous with Feasibility Study &amp; Industry Interactions</li><li>➤ <b>Completed by Dec 16/Jan 17</b></li></ul>
3	Cat & AoN (as per DPP 2016)	<ul style="list-style-type: none"><li>➤ <b>Planned by Mar 17</b></li><li>➤ Sanction for:-<ul style="list-style-type: none"><li>▪ MoQ</li><li>▪ Devp Budget Allocation</li><li>▪ Scope of Proj</li><li>▪ Assistance to DAs</li></ul></li></ul>



# **MAKE PROJ : DGMF**



## **125MM SB GUN BRL & IMPROVED AMN FOR T- 72 & T- 90 TANKS**



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Pin 110001**





# 125MM SB GUN BRL & IMPROVED AMN FOR T- 72 & T- 90 TANKS



## SCOPE

### **MRS/ ATT:**

Can be provided

### **Gun Brl:**

Same Design/ High MPa 600-700

### **Msl Firing:**

To be incorporated

### **FCS :**

No Change permitted,  
Existing

### **Stab Sys:**

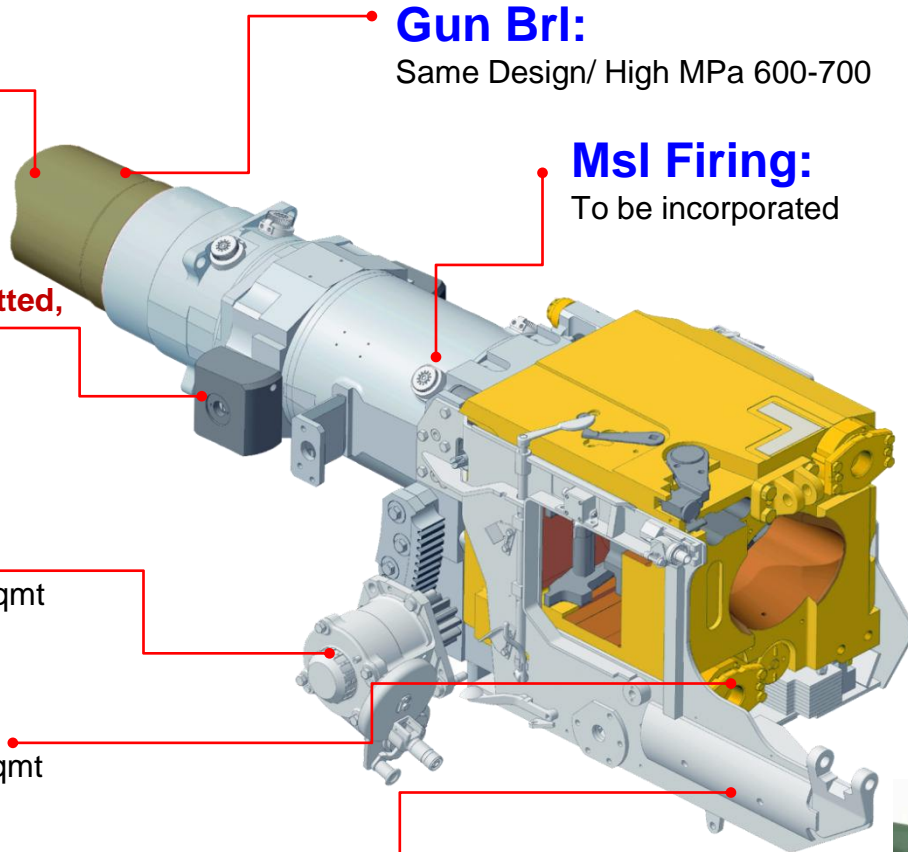
Change as per Reqmt

### **Recoil Sys:**

Change as per Reqmt

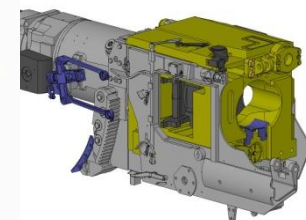
### **Gun Article :**

Same as T 90  
Specs,Interchangeable



## **Challenges Involved :**

- **New Gun Brl** : High MPa, Improved Metallurgy
- **Msl Firing** : To be integrated
- **Gun Article** : Interchangeable
- **Recoil Sys** : As per Reqmt
- **Stab Sys** : As per Reqmt
- **MRS, ATT** : Can be provided
- **FCS** : No Change incl BCU & Sights
- **Other** : Alteration in Conveyer, CLM and Ejection Mechanism if required. No other sys to be altered in fighting compartment





# 125MM SB GUN BRL & IMPROVED AMN FOR T- 72 & T- 90 TANKS



## Status/ Update

- **Scope has been defined**
- **Draft PSQR under formulation**
- **Feasibility Study to be Convened Shortly**



## Industry Interactions

- **1<sup>st</sup> Interaction ACCS- Jul 16**
- **2<sup>nd</sup> Interaction - Sep 16**
- **Vendor Response :**
  - ✓ M/s Bharat Forge Ltd
  - ✓ M/s Happy Forgings Ltd
  - ✓ M/s Ramakrishna Forging Ltd
  - ✓ M/s Bhilai Engg Corpn Ltd
  - ✓ M/s Larsen & Toubro
  - ✓ M/s Techno mechanical Service Pvt Ltd





# **125MM SB GUN BRL & IMPROVED AMN FOR** **T- 72 & T- 90 TANKS**



## **BASIC QRs**

<b>Ser No</b>	<b>Parameter</b>	<b>Capability</b>
(i)	<b>Equipment</b>	Tank Gun Barrel (including gun articles) and associated systems on T 90 Design
(ii)	<b>Integration</b>	With existing T-90 & T-72 FCS.
(iii)	<b>Capability</b>	To fire ATGM through gun barrel and APFSDS ammunition with DoP $\geq$ 600mm RHAE.
(iv)	<b>Ammunition</b>	APFSDS, HEF, HEAT & ATGM.
(v)	<b>Misc Capb</b>	MRS & ATT to be provided



# 125MM SB GUN BRL & IMPROVED AMN FOR T- 72 & T- 90 TANKS



<u>S No</u>	<u>Next Action/ Steps</u>	<u>Remarks</u>
1	Feasibility Study	<ul style="list-style-type: none"><li>➤ To be convened shortly</li><li>➤ <b>Completed by Dec 16</b></li></ul>
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3	Cat & AoN (as per DPP 2016)	<ul style="list-style-type: none"><li>➤ <b>Planned by Mar 17</b></li><li>➤ Sanction for:-<ul style="list-style-type: none"><li>▪ MoQ</li><li>▪ Devp Budget Allocation</li><li>▪ Scope of Proj</li><li>▪ Assistance to DAs</li></ul></li></ul>

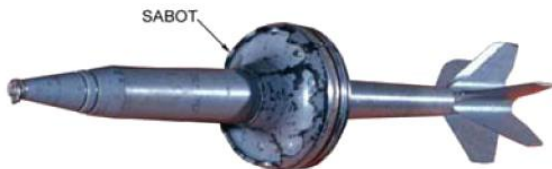
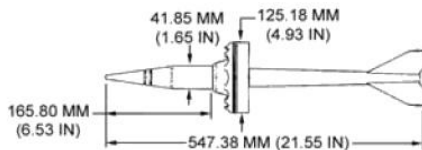




# MAKE PROJ : DGMF



## 125MM APFSDS AMMUNITION WITH HIGH DoP OF 600 – 800MM



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# 125MM APFSDS AMMUNITION



## SCOPE

### Performance:

DoP 600 to 800mm RHAe at 2000m, in phases

### LRP :

As per OEM Design,  
Existing Carousel

### Sight Sys:

No Change to existing Sights

### FCS:

Integration with existing FCS  
Ballistic data for inputs in BCU

### Shelf Life :

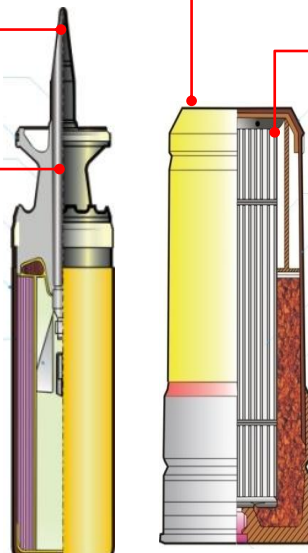
Minimum 10 Years  
ISAT before User Trials

### Design:

As per OEM

### Pressure:

Below 650 MPa

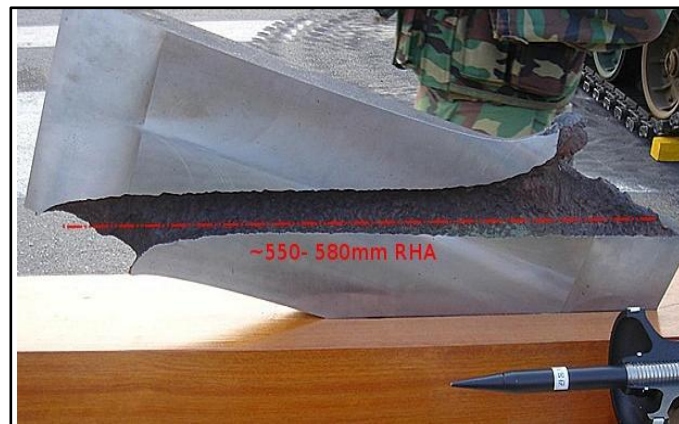


### Packing Mtrl :

Palletized Containers

## Challenges Involved:

- **Performance** : 600-800mm (beyond ERA in Ph)
- **Design** : For T 72 & T 90 Brls
- **Pressure** : Below 650 MPa
- **LRP** : Existing Carousel Size
- **Sights**: No Change in Graticule
- **FCS** : No Change incl BCU & Data feeding to be ensured (Range |Tables)
- **Shelf Life** : Min 10 Yrs ( ISAT)
- **Packing Mtrl** : Palletized, capable of handling by a tank crew





# 125MM APFSDS AMMUNITION



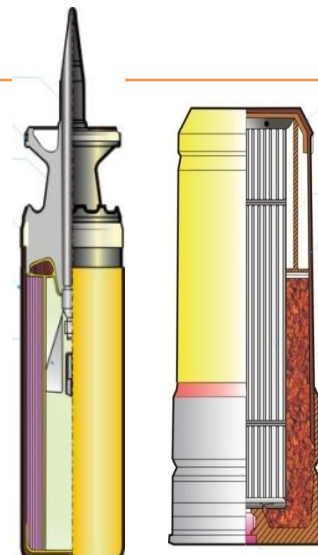
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- **Scope has been defined**
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## Industry Interaction

- **1<sup>st</sup> Interaction ACCS- Jul 16**
- **2<sup>nd</sup> Interaction – Sep 16 (3<sup>rd</sup> Week)**
- **Vendor Response :**
  - ✓ **M/s Bharat Forge Ltd**
  - ✓ **M/s Rajasthan Expl and Chemicals Ltd (RECL)**
  - ✓ **M/s Padamsree Enterprises**





# 125MM APFSDS AMMUNITION



<u>Aspect</u>	<u>Upgrade Requirement</u>	<u>Remarks</u>
<b>Performance</b>	DoP of 600mm-800mm of RHA @ 2000m MPa (Below 650)	Capable of being fired from newly developed Brl for T 72 & T 90 tks DoP of 600- 800mm RHAe to be achieved (beyond ERA in stages)
<b>Design</b>	New Design	As per OEM
<b>LRP</b>	As per Design Mtrl of OEM Choice	Preferably to be accommodated with in existing carousal with minimum changes
<b>Sight Sys</b>	To be integ with existing sights	No Change permitted
<b>FCS</b>	Integrate existing FCS (TIFCS) Ballistic Data to be fed in BCU	Integration issues be resolved (linkages/ sensors & BCU)
<b>Shelf Life</b>	Min 10 Yrs	ISAT trials - before User Trials
<b>Packing Mtrl</b>	Palletised containers	Capable of being lifted by a tk crew in fd





# 125MM APFSDS AMMUNITION



<u>S No</u>	<u>Next Action/ Steps</u>	<u>Remarks</u>
1	Feasibility Study	<ul style="list-style-type: none"> <li>➤ To be convened shortly</li> <li>➤ <b>Completed by Dec 16</b></li> </ul>
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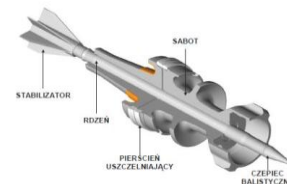
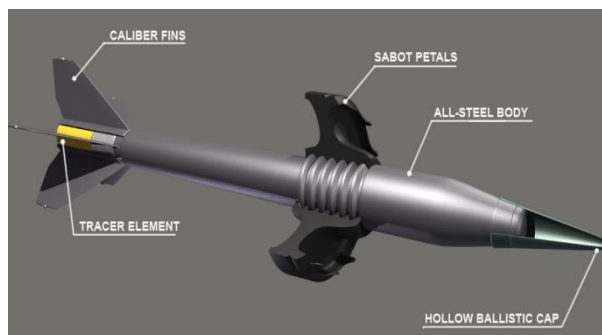


Tabela 3

	125 mm APFSDS-T (WITU)	Modernizacja z sabotem kompozytowym
Masa pocisku (kg)	7,55	5,55
Masa sabota (kg)	3,85	1,85
Masa rdzenia (kg)	3,7	3,7
Predkość początkowa (m/s)	1650*	1764**
Max. Ciśnienie na zamiek (MPa)	532,8**	408**
Max. Ciśnienie na pocisk (MPa)	357,7**	305**
Przebiecie płyty RHA na odł. 2000m (mm)	500*	~610

\* dane uzyskane podczas badań kwalifikacyjnych partii przygotowanej  
\*\* dane uzyskane za pomocą programu PGBW - PZB2







# MAKE PROJECTS



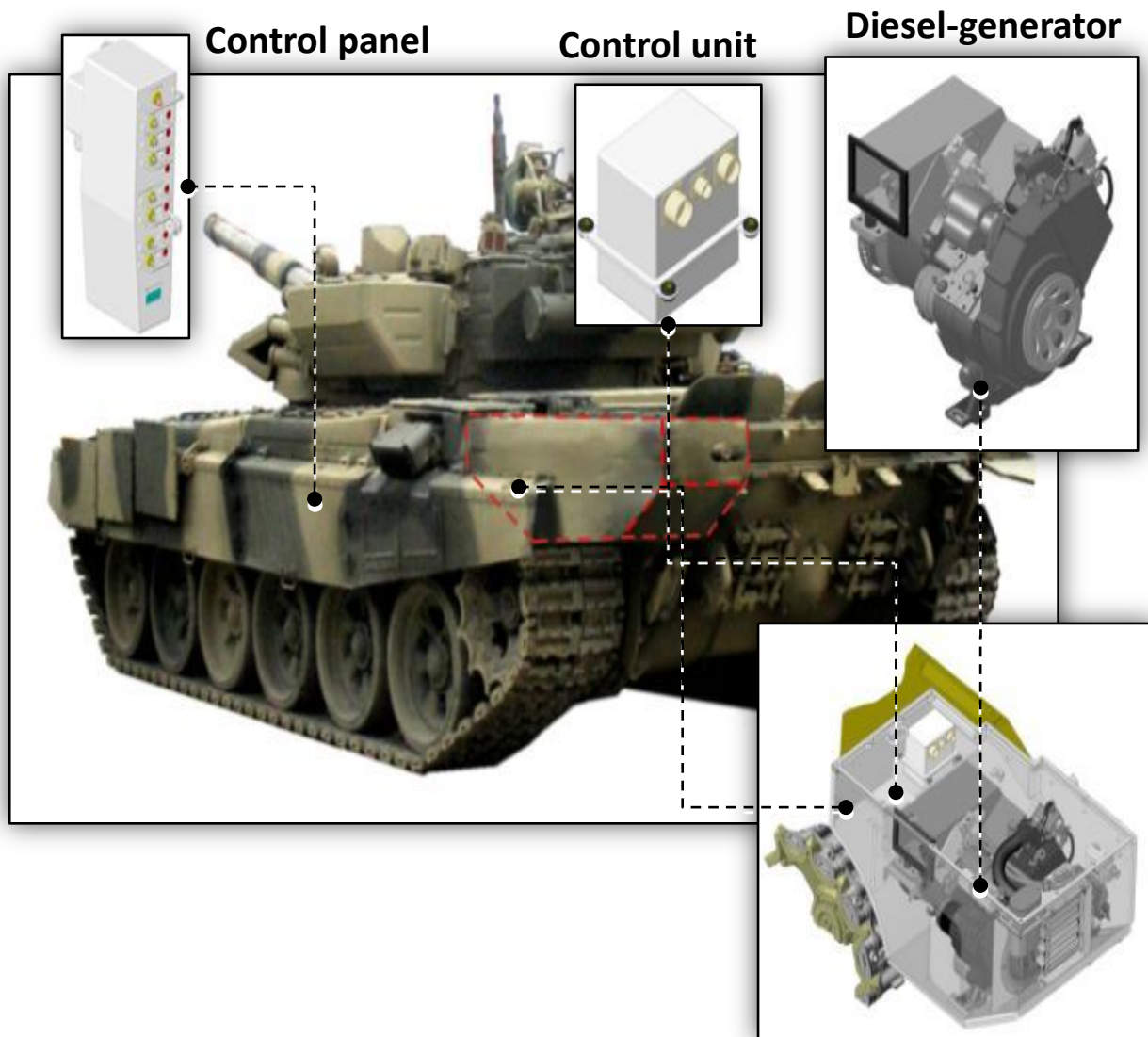
SER NO	SCHEME NOMENCLATURE	QUANTITY
1.	AUXILIARY POWER UNIT FOR TANK T-90 (APU)	1657
2.	ENVIRONMENT CONTROL UNIT FOR TANK T-90 (ECU)	1657
3.	INDIVIDUAL UNDER WATER BREATHING APPARATUS (IUWBA) FOR T-90 CREWS	6628

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**Dir Modernisation (AC)**  
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**Sena Bhawan, New Delhi-110011**

## **AUXILIARY POWER UNIT FOR TK T-90**



# AUXILIARY POWER UNIT FOR TK T-90





# INDUSTRY INTERACTION



- Broad QRs and Questionnaires uploaded on MoD website in June 16
- Initial Industry Interaction carried out in mid July & August 16 at DGMF
- Familiarisation program for Indian Industry towards harnessing 'Make in India' initiative for Mech Forces conducted at Ahmednagar 07-09 Jul 16
- Interactive Workshop & Equipment Park towards 'Make in India' initiative for Mech Forces conducted at Ahmednagar 15-16 Jul 16

## ▪ Vendors Responded to Inputs for Feasibility Study

- M/s Fedders Lloyd Corporation
- Greaves Cotton Ltd
- Flash Forge Private Ltd
- Sterling Generators
- HBL Power Sys Ltd
- SATTVA AERO Accessories & Sys Pvt Ltd
- MAK Controls and Systems
- Cooper Corporation Pvt Ltd

## • Vendors Asked to Respond to Questionnaire Uploaded on Website

- Statcon Power Controls Ltd
- Kalyani Strategic Systems Ltd
- Wiperdrive Engineering
- TATA Motors

- Next Industry Interaction scheduled in mid Sep 2016

# OPERATIONAL CHARACTERISTICS: APU

➤ **Concurrently operate** the following systems of the tank in silent mode (Main engine of the tank switched off) **for at least Six hours:-**

- Gunner & commander sights
- Fire Control System
- Stabiliser system
- Thermal Imaging Sight
- Radio Set
- Inter Communication System
- Charging of batteries
- Navigation aid equipment.
- **Environment Control System**
- **Battle Field Management System**



## APU INTEGRATED ON A TANK

- The system should not foul with existing features of the tank, or hinder movement of gun
- Cutting of armour is **not permitted, drilling/welding if resorted to, should not be in the frontal 60° arc of the tank.** It should not compromise the overpressure system of the tank
- The APU should be **water cooled and DHPP 'A' driven**

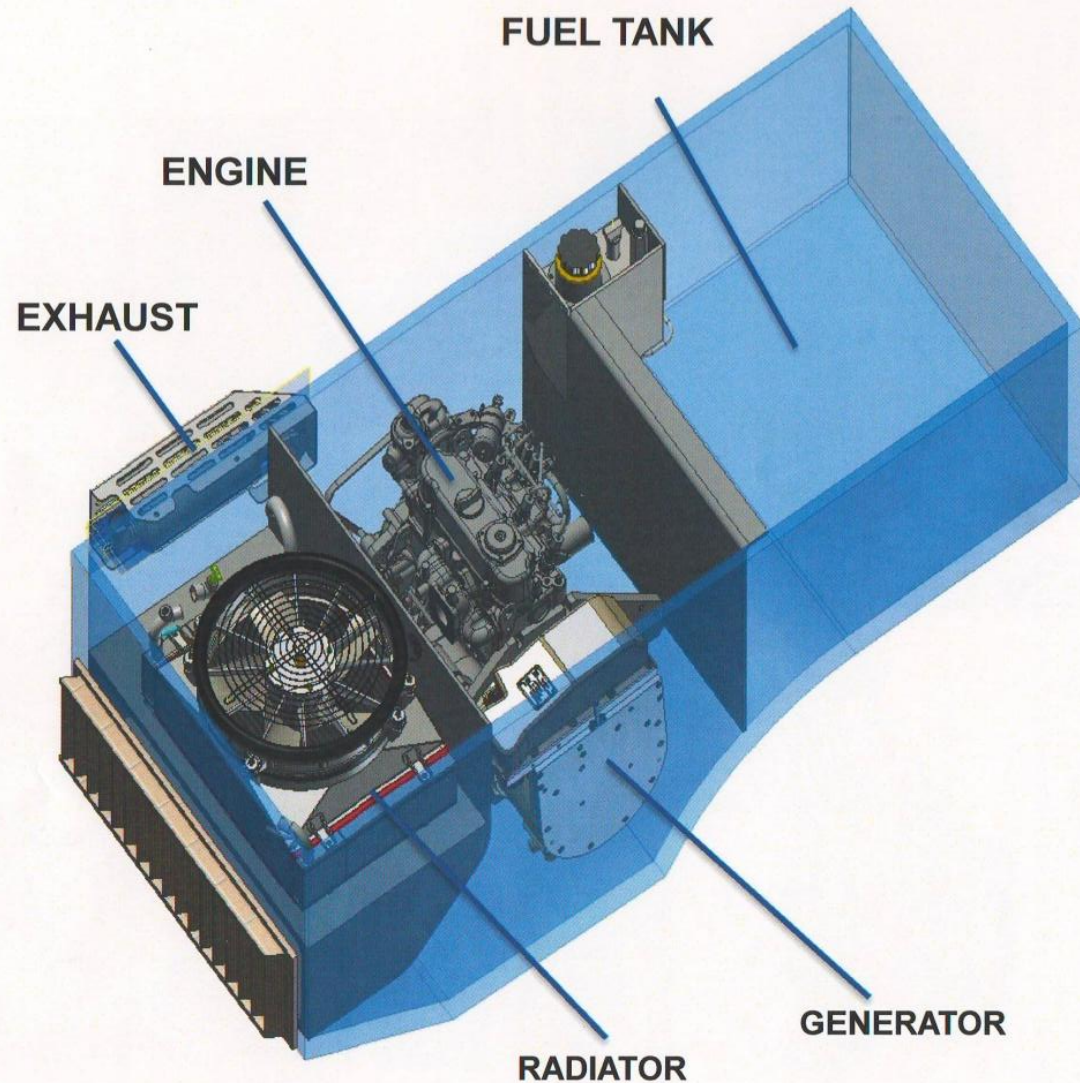
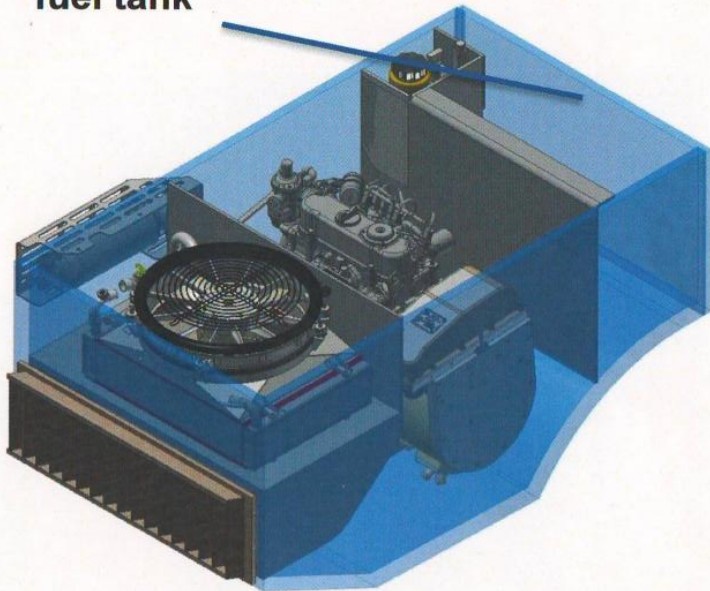
# PHYSICAL CHARACTERISTICS

- **Size and Shape**. The system should not change the **overall dimensions of the tank in vertical and horizontal plane**, when viewed from the front. The system may be **fitted externally** either on the side of the tank or to the rear (behind the engine compartment)
- **Life**. The APU should be designed to last for **2500-3000 engine hours**
- **Power Rating**: **10- 12 KW** at 27.5  $\pm$ 1V DC
- **Weight**: The weight of the APU should be **350-500 Kg**
- **Protection**- **STANAG Level-3**
- The system should meet the **MIL 461 E standards** with regard to **EMI/EM compatibility**



# AN EXISTING CONFIGURATION FOR AN APU

Reduced size  
fuel tank



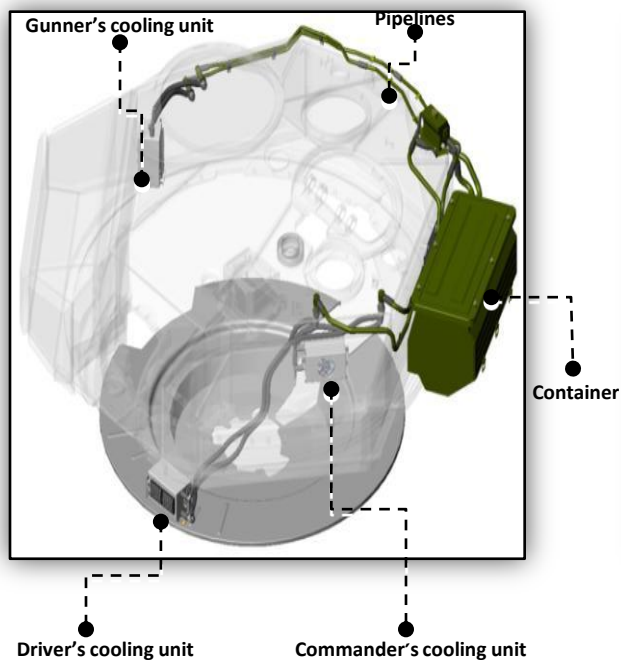
## CHALLENGES

- Compact Size
- Integration with Tank
- Heat Dissipation
- Sealing during fording

# **ENVIRONMENT CONTROL UNIT (ECU) FOR TANK T-90**

# ENVIRONMENT CONTROL UNIT (ECU) FOR TANK T-90

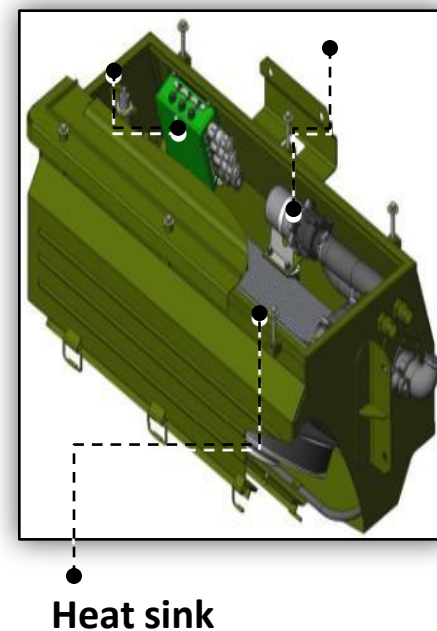
## TURRET WITH CONDITIONER



## COOLING UNIT WITH CONTROLS

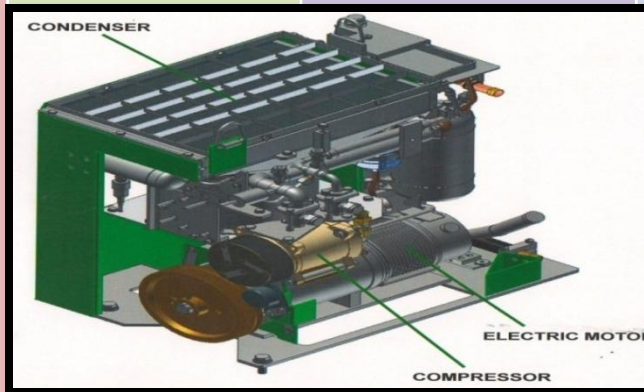


## CONTAINER



# ENVIRONMENT CONTROL UNIT (ECU) FOR TK T-90

<u>Brief Description</u>	<u>Quantity</u>	<u>Annual Requirement</u>	<u>Present Status</u>
<ul style="list-style-type: none"> <li>• Equipment within the tank are <b>sensitive to adverse weather &amp; dust conditions</b></li> <li>• Ambient temperatures in desert/ semi-desert rises beyond 50°C</li> <li>• The heat generated by the tank engine and the main gun within the confined space, raises the temperature within well beyond 50°C</li> <li>• Requirement of an <i>Environmental Control System to avoid degradation to the onboard opto-electronics</i></li> </ul>	<p><b><u>Qty - 1657</u></b> (Total requirement)</p>	<p>250 - 300 with effect from 2019-20 towards delivery of total quantity</p>	<p><b><u>Vendors Responded To Inputs for Feasibility Study</u></b></p> <ul style="list-style-type: none"> <li>▪ Ms/ Fedders Lloyd</li> <li>▪ Flash Forge Private Ltd</li> <li>▪ Mak Controls &amp; Sys (Pvt) Ltd</li> </ul> <p><b><u>Vendors Yet to Respond to Questionnaire Uploaded on Website</u></b></p> <ul style="list-style-type: none"> <li>▪ Osho Corp Global Ltd</li> <li>▪ TATA Motors Limited</li> <li>▪ Kalyani Strategic Systems</li> </ul>



# OPERATIONAL CHARACTERISTICS

- The system should not foul with existing features of the tank, hinder movement of gun or involve relocation of ammunition
- Cutting of armour is **not permitted**. Drilling/welding if resorted to, should not be in the **frontal 60° arc of the tank**.
- Fitment should not compromise the overpressure system and the NBC protection system of the tank.
- The Environmental Control Unit should be **able to operate continuously for 10-12 hours**
- The Environmental Control should be **easy to retrofit onto a T-90S/SK tank in field workshops**.
- Final inside temperature desired : **25° ±5 °C** (hatches closed) **in an ambient temperature range from -5° C ± 5° C to 45° C ± 5° C**. For temperatures beyond 45° C ambient a minimum of 15° C drop in temperature within the tank must be effected.
- The system should be able to **achieve the stipulated final temperature inside temperature within 30 minutes**
- **Durability**. The system should provide for a minimum **Mean Time Between Overhaul (MTBO) of 1000 hours** .



# PHYSICAL CHARACTERISTICS : ECU

- Environmental Control Unit should be housed outside the crew compartment suitably protected with only minimal fitments like **cooling ducts with units and control panels inside the crew compartment**
- The desired physical characteristics of Environmental Control Unit are: -
  - **Size and Shape.** The system should be compact **wherein the existing fitment items in the crew compartment should not be removed.** The main assemblies of **heat exchanger and pump etc to be placed outside** with only the cooling units and ducts inside the crew compartment
  - **Power Supply.** The ECU should be able to operate from the mains, 24V output and also from APU output.
  - **Protection. STANAG Level-3**
  - **Preservation Desired.** The system should comprise sealed units and be water resistant upto a depth of 5 meter while tank is carrying out fording operations.
  - The system should meet the MIL 461 E standards **with regard to EMI/EM compatibility.**

# **INDIVIDUAL UNDER WATER BREATHING APPARATUS** **(IUWBA) FOR T-90 TANK CREWS**

# INDIVIDUAL UNDER WATER BREATHING APPARATUS (IUWBA) FOR T-90 TANK CREWS



# INDIVIDUAL UNDER WATER BREATHING APPARATUS

<u>Brief Description</u>	<u>Quantity</u>	<u>Annual Requirement</u>	<u>Present Status</u>
<ul style="list-style-type: none"> <li>During deep fording, in the eventuality of the tank stalling/switching off mid-crossing, there is no alternative for the crew <b>but to flood the tank to escape from the fighting/ driver compartments</b> of the tank and reach the surface of the water as per the enunciated emergency escape procedure</li> <li><b>Individual Under Water Breathing Apparatus (IUWBA)</b> will ensure complete safety of the T-90 tank crew during emergency escape procedure</li> </ul>	<p><b><u>Qty</u> - 6628</b></p>	<p><b>2000 with effect from 2019-20</b></p>	<p><b><u>Vendors Responded</u></b></p> <ul style="list-style-type: none"> <li><b>Flash Forge</b></li> <li><b>Jyotech</b></li> <li><b>Sure Safety (India) Pvt Ltd</b></li> <li><b>Osho Corp Global Pvt Ltd</b></li> <li><b>H&amp;H Precision Pvt Ltd</b></li> </ul>



# OPERATIONAL CHARACTERISTICS

- Time required to wear the IUWBA by a tank crew outside the tank should be  $\leq$  45 seconds.
- The ***crew should be able to operate continuously in a flooded tank for a duration of 45 minutes*** while wearing the IUWBA.
- Should facilitate crew to carry out routine activity inside and outside the tank when wearing the IUWBA.
- The IUWBA should be capable of operating in temperature ranges of  $+4^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$ .
- For the purpose of trials the IUWBA will be trial evaluated at ambient temperatures between  $35^{\circ}\text{C}$  to  $45^{\circ}\text{C}$  only.
- The equipment should be dust, moisture and leak proof and retain its efficiency when stored at temperature range from  $-5^{\circ}\text{C}$  to  $55^{\circ}\text{C}$ .
- The equipment ***should have a provision for recharging/replacement of the canister.***

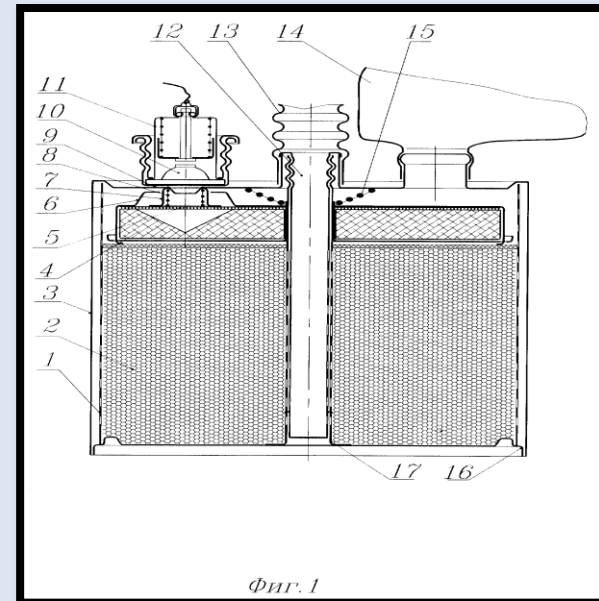


# OPERATIONAL CHARACTERISTICS

- The shelf life of IUWBA should be  $\geq 10$  years.
- The IUWBA should be repairable or replaceable (as the case may be) at field workshop level. Suitable testing equipment should be provided along with it.
- **MTTR**. 45 minutes for module level replacement with a vendor certification for the same.
- **MTBF**. The equipment should have a MTBF of 100 hours with a vendor certification for the same.



**Face Mask-IUWBA**



**Regenerative Canister**

# PHYSICAL CHARACTERISTICS

- Thee IUWBA should provide **positive buoyancy** to each crew member during the emergency escape procedure which can be activated on demand.
- The IUWBA should be a **stand-alone equipment** to be worn by individual crew members which does not require to be integrated with the tank.
- The IUWBA should be **compact enough to be stowed in the under stream crossing equipment (USCE) tool box of the tank** when not in use.
- The IUWBA should be separate for each crew member having a breathing inlet in the form of a Face Mask for each crew member.
- The IUWBA should have a **manual valve opening and closing mechanism** which is easily accessible.
- Weight of the IUWBA **should not exceed 5 Kg**

# WAY FORWARD

Completion of Feasibility  
Study- **By 30 Nov 16**



Formulation of  
PSQR- **By Jan 2017**



# MAKE PROJECTS: DG CE

## SCHEMES

### **Heliportable Tracked Light Dozer (TLD)**



### **Assault Track Way Class - 24**



## PROJECT MANAGER

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# TRACKED LIGHT DOZER (TLD)



## Preview

- Project Details & Existing Dozer.
- Design Challenges.
- Inputs Sought from Industry.
- Industry Interactions Conducted.
- Way Ahead.

# TRACKED LIGHT DOZER : EMPLOYMENT



**To be employed in mountainous terrain for a variety of earth moving tasks such as track construction, levelling & snow clearance etc.**

# PROJECT DETAILS

S No	Project Details	Description
1.	<b>Broad Specifications</b>	<ul style="list-style-type: none"><li>• Capable of being <b>lifted by in-service helicopters</b> up to an altitude of 4000m.</li><li>• <b>Modular parts - to be transported as separate helicopter loads.</b></li><li>• <b>Each helicopter load in the range of 1000 kg.</b></li><li>• Capable of being <b>disassembled/ assembled in field</b> with ease, without the need of any specialised equipment.</li><li>• Minimum operating temperature up to (-) 20°C.</li></ul>
2.	<b>Tentative Quantity</b>	<b>Approximately 150</b> with anticipated requirement of <b>15-20 per year</b> for 10 years with spares and overhaul support.
3.	<b>Present Status</b>	<ul style="list-style-type: none"><li>✓ Broad QRs uploaded on MoD website.</li><li>✓ Interaction with vendors commenced with effect from Mar 16.</li><li>✓ Feasibility being analysed in conjunction with Air Force.</li></ul>



# EXISTING IN-SERVICE BD-50 CRAWLER DOZER

## ➤ Brief Specifications.

- **Engine** : Water cooled, turbo charged, direct injection.
- **Rated BHP** : 74.5 KW (100 hp) @ 1750 rpm.
- **Flywheel Power** : 67 KW (90 hp) (@ 1750 rpm.
- **Max Drawbar Pull** : 10340 kg.
- **Blade Capacity** : 20 cum.
- **Operating Mass** : 11000 kg.



# DESIGN CHALLENGES

- *Design of equipment is restricted by dimensions/ lift capacity of in-service helicopters.*
- *Modularity - assembly of dozer in field conditions in acceptable timeframe.*
- **Aim to formulate QR of equipment as per capability of Industry & Air Force.**



# INPUTS SOUGHT FROM INDUSTRY

- ✓ **Total weight of machine.**
- ✓ **Break down into heliportable loads.**
- ✓ **Dimensions of each load component.**
- ✓ ***Arrangements, equipment, manpower requirements & TIMEFRAME for assembly in field conditions.***

## Possible Breakdown of Equipment

1.	Track Drive Assembly (LH)	<ul style="list-style-type: none"><li>• Weight</li><li>• Dimensions</li><li>• Minimum Assembly Effort</li></ul>
2.	Track Drive Assembly (RH)	
3.	Engine & HST Drive, Pumps, Motors etc	
4.	Chassis	
5.	Cabin with accessories	
6.	Dozer Blade with Frame & Cylinders	
7.	Undercarriage Components & Radiator etc	
8.	Loose Items : FOL, Hydraulic & Fuel Tanks, Hoses, Fittings, Battery, Inlet & Exhaust System	
9.	Hydraulic Winch & Rope, Hydraulic Motor	

# VENDOR INTERACTIONS

S No	Date	Vendors
1.	03 Dec 15	M/s Caterpillar India Pvt Ltd
2.	02 Mar 16	M/s Caterpillar India Pvt Ltd
3.	16 May 16	<ul style="list-style-type: none"> <li>• M/s Span Industries</li> <li>• M/s BEML Ltd</li> <li>• M/s ACE Ltd</li> </ul>
4.	14 Jul 16	M/s Span Industries – second interaction being finalised
5.	03 Aug 16	M/s ACE Ltd
6.	Request for Interaction Received - Dates Being Finalised	<ul style="list-style-type: none"> <li>• M/s BEML - <i>have intimated capability to demonstrate knocking down/ assembly of BD-31 dozer</i></li> <li>• M/s Mahindra &amp; Mahindra Ltd</li> </ul>

Increased Participation of Vendors Requested

# TRACKED LIGHT DOZER : WAY AHEAD

- ✓ *Arrive at a workable solution keeping in mind challenges*
- ✓ *Synchronisation with Air Force to confirm carriage by in service helicopters.*
- ✓ *Finalise QRs & Feasibility Study.*

Roadmap		
1.	Approval and Issue of Convening orders	15 Sep 16
2.	Arrive at broad details of knocked down loads including arrangements for assembly in field	End Sep 16
3.	Sharing of broad design details with Air Force	Mid Oct 16
4.	Interaction & concurrence from Air Force regarding feasibility/ capability to lift TLD	End Oct 16
5.	Visit to selected Industries/ Establishments	Nov 16
6.	Completion of Feasibility Study co-opting reps of EME, DRDO, DGQA & MoD (Fin)	End Jan 17

# ASSAULT TRACK WAY (ATW) CLASS - 24

## Preview

- Project Details.
- Details of In-Service ATW.
- Industry Interactions Conducted.
- Way Ahead.



# PROJECT DETAILS

S No	Project Details	Description
1.	Brief	<ul style="list-style-type: none"><li>• Light weight track material to be employed in <b>desert/ semi desert</b> terrain for <b>mobility of supply &amp; ammunition vehicles</b>, bridging vehicles &amp; artillery guns.</li><li>• To replace existing Aluminium Alloy based Assault Track Way.</li><li>• Utilisation for <b>helipads, improvement of existing tracks, approaches &amp; exits.</b></li></ul>
2.	Broad Specifications	<ul style="list-style-type: none"><li>• Temp tolerance up to (+)50<sup>0</sup> C.</li><li>• High Density Thermo Plastic Polyurethane/ <b>suitable light weight material</b> - surface finish to blend with terrain.</li><li>• Facilitate <b>ease of laying/ recovery.</b></li><li>• Life of the track material – approximately 20,000 passes.</li></ul>
3	Present Status	<ul style="list-style-type: none"><li>✓ Broad QRs uploaded on MoD website - draft PSQR prepared.</li><li>✓ Interaction with vendors commenced with effect from Jun 16.</li><li>✓ <b>Increased participation of Industry solicited.</b></li></ul>



# EXISTING ASSAULT TRACK WAY





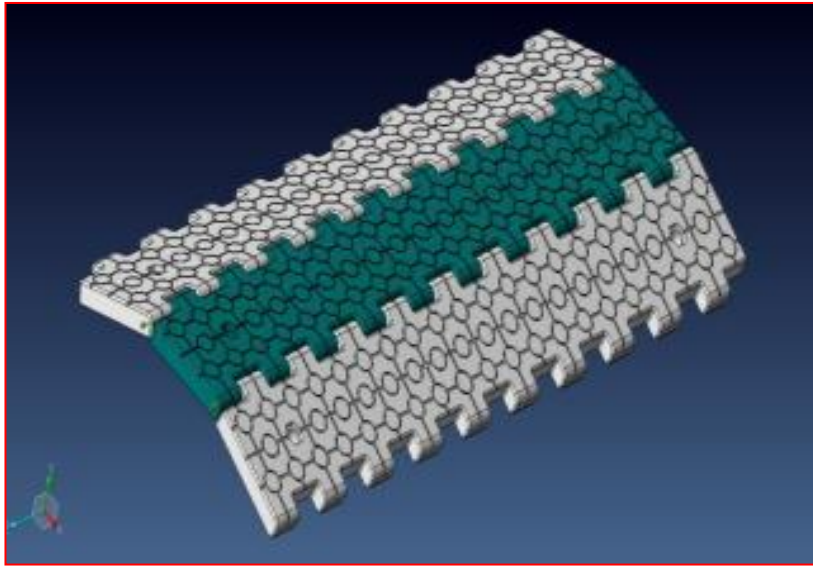
# EXISTING ASSAULT TRACK WAY

## ➤ Specifications.

- **Size of each roll** : 25 x 1 m.
- **Weight of each Roll** : 350 kg.
- **Lorry Load** : 8 rolls/ Ashok Leyland Stallion (ALS).
- **Vehicles Required** : 11 ALS/ kilometer (10% reserve included).
- **Design**
  - ✓ Aluminium alloy extrusions in the form of planks which are joined to form 25 m rolls, 1 m wide.
  - ✓ Laid as two tread ways, separated by 0.75 m - distance between them is maintained by spacer bars.
  - ✓ Treadways are held down by spikes/ pins.



# ASSAULT TRACK WAY : LIGHT COMPOSITE MATERIAL



COMPOSITE MATERIAL ATW



STRESS TOLERANCE : LOAD CLASS 24 VEHICLE MOVEMENT

# VENDOR INTERACTIONS & WAY AHEAD

S No	Date	Vendors
1.	07 Jun 16	M/s MTandT
2.	23 Aug 16	M/s Sintex Industry Ltd
✓ <b>Low development cost - ideal for participation by MSMEs</b> ✓ <b>Increased vendor participation requested through communication to CII</b>		

Roadmap		
1.	Approval and Issue of Convening Orders	15 Sep 16
2.	Interaction with Industry	End Oct
3.	Visit to selected Industries/ Establishments	Nov 16
4.	Completion of Feasibility Study co-opting reps of EME, ASC, Artillery, DRDO/ VRDE, DGQA & MoD (Fin)	End Dec 16
5.	Approval of Feasibility Study	End Jan 17



# **DIRECTORATE GENERAL OF ARMY AIR DEFENCE**



**AERIAL TARGET SYSTEMS**

# **AERIAL TARGET SYSTEMS**

- ❖ **Advance Pilot Target Aircraft (APTA).**
- ❖ **Manoeuvrable Expendable Aerial Target (MEAT).**

**Col Harison verma  
Project Manager  
Tele/ Fax :23333632  
Email : [proc.aad-army@nic.in](mailto:proc.aad-army@nic.in)**



## **ADVANCED PILOTLESS TARGET AIRCRAFT (APTA)**

<b>Ser No</b>	<b>Nomenclature</b>	<b>Description</b>	<b>Remarks</b>
<b>1.</b>	<b>Brief Description</b>	<b>APTA is a sys based on jet engine consisting of a reusable airborne veh, towed tgt sys and grnd control / sp sys suitable for exercising and evaluating surface to air, guns and missiles.</b>	
<b>2.</b>	<b>Cost</b>	<b>Not Known</b>	
<b>3.</b>	<b>Annual Requirement</b>	<b>4-5 per year</b>	
<b>4.</b>	<b>Present Status</b>	<b>❖ Broad QRs have been uploaded on MoD website. ❖ Industry interaction carried out wef 27 – 29 Jul 16. ❖ PSQR under formulation.</b>	

# ADVANCED PILOTLESS TARGET AIRCRAFT(APTA)



**DO - DT45**



**MIRACH**



# ADVANCED PILOTLESS TARGET AIRCRAFT (APTA)

Ser No	Parameters	Reqmts
(a)	Max Speed	Not less than 0.6 Mach at 6000m alt.
(b)	Max Endurance	Not less than 45 mins at 4000 m alt.
(c)	Min Alt	Not less than 300m.
(d)	Max Alt	Not less than 8km.
(e)	Recovery	Land (parachute based).
(f)	Rg	Radio control up to 60 Kms or more and autonomous mode up to 100 Kms.
(g)	Employability	SRSAM, QRSAM and MRSAM.
(h)	Tow Bodies	IR Responsive, Rdr Responsive and Sleeves.

## **MANOEUVRABLE EXPENDABLE AERIAL TARGET (MEAT)**

<b>Ser No</b>	<b>Nomenclature</b>	<b>Description</b>	<b>Remarks</b>
<b>1.</b>	<b>Brief Description</b>	<b>MEAT is a sys based on jet engine consisting of an airborne veh and grnd control / sp sys suitable for exercising and evaluating surface to air, guns and missiles.</b>	
<b>2.</b>	<b>Cost</b>	<b>Not Known</b>	
<b>3.</b>	<b>Annual Requirement</b>	<b>50 per year</b>	
<b>4.</b>	<b>Present Status</b>	<b>❖ Broad QRs have been uploaded on MoD website. ❖ Industry interaction carried out wef 27 – 29 Jul 16. ❖ PSQR under formulation.</b>	

# MANOEUVRABLE EXPENDABLE AERIAL TARGET (MEAT)



# MANOEUVRABLE EXPENDABLE AERIAL TARGET (MEAT)

Ser No	Parameters	Reqmts
(a)	Max Speed	Not less than 400 Kmph or more (111 m/s).
(b)	Max Endurance	Not less than 30 mins or more at Wide Open Throttle at sea level.
(c)	Min Alt	Not less than 20m or less.
(d)	Max Alt	Not less than 5000m or more.
(e)	Range	Radio Control up to 75 Km or more.
(f)	Employability	SRSAM, QRSAM and MRSAM.



# **INDUSTRY INTERACTION : PROBABLE** **DESIGN AGENCIES**

<b>S.No</b>	<b>Vendors/Firms</b>
<b>1.</b>	<b>Triven Industries Pvt Ltd, Hyderabad</b>
<b>2.</b>	<b>Powergear Ltd, Chennai</b>
<b>3.</b>	<b>Elcomponics Aerob Pvt Ltd, Noida</b>
<b>4.</b>	<b>Kadet Defence Systems, Kolkata</b>
<b>5.</b>	<b>Agnice Fire Protection Pvt Ltd, Gurgaon</b>
<b>6.</b>	<b>Sure Safety Solutions Pvt Ltd, Mumbai</b>

# **INDUSTRY INTERACTION : PROBABLE** **DESIGN AGENCIES**

<b>S.No</b>	<b>Vendors/Firms</b>
<b>7.</b>	<b>Centum Electronics Ltd, Bangalore</b>
<b>8.</b>	<b>L &amp; T</b>
<b>9.</b>	<b>UCAL-JAP Systems Ltd, Chennai</b>
<b>10.</b>	<b>Mahindra Defence Land Sys</b>
<b>11.</b>	<b>Kinetix Engineering Solutions Ltd , Bangalore</b>
<b>12.</b>	<b>Micronel Global Engineering, Bangalore</b>
<b>13.</b>	<b>Tata Advance Systems Ltd</b>
<b>14.</b>	<b>Bharat Forge India Ltd</b>

# **WAY FORWARD**

- **Completion of Feasibility Study and approval of PSQR within one month.**
- **Case for AON likely to be initiated within next three months. Expression of Interest(EOI) to the industry within three months of AoN.**



**JAI HIND**