Stabilized Missile Launchers & Guns for Naval Platforms

(FICCI)
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<td>Tata Power SED has Experience with the following Design development and supply of Launchers &amp; Guns for Indian Army, Air force &amp; DRDO Naval Combat &amp; EW Sub-systems</td>
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Tata Power SED’s Experience in Guns and Missile/Rocket Launcher systems

PINAKA Multi Barrel Rocket Launcher (MBRL)

Key Features

- Awesome fire power - 12 rockets can be fired at intervals of 4s
- The mission of this all-weather all-terrain Artillery weapon system is to deliver large volume of fire within a very short time
- Reinforced chassis vehicle to provide a platform for mounting the armament system
- Hydraulically actuated outriggers to level & stabilise the vehicle during firing
- Special alloys are cast for the structures to keep their weight compatible with the capacity of the vehicle

TRISHUL Missile Launcher

Key Features

- Integrated on BMP
- Tracking & Positioning
- Four missiles to be positioned in 2.5 sec
SAMYUTKA ELECTRONIC WARFARE PROGRAM

Key Features

- High velocity & acceleration to achieve positions during tracking
- Hydraulically controlled stages for achieving the heights up to 15m
- Servo Drives incorporating BLDC and DSP controller to work in harsh Environment
Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems

Key Features

- High Positional & Tracking Accuracy
- Continuous 360° Operation in Azimuth
- Remote-Controlled tracking of targets & launching of missiles
- Auto-Leveling with four stabilizers for ground pressure up to 4kg/cm²
- Battery Assisted silent Mode operation

AKASH Army Launcher

AKASH Air Force Launcher

ASPL I & II on BMP Crew Carrier

ASPL III on T72 Tank

Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems
Tata Power SED’s Experience in Guns and Missile/Rocket Launcher systems

MOBILE LAUNCHER SYTEM - MRSAM

Key Features

- 2 x 25 kVA redundant on board DG power supply
- UPS for Missile & control Electronics
- Jet deflector for Plume management
- Level Correction for ±7° combined PITCH & ROLL
Tata Power SED’s Experience in Guns and Missile/Rocket Launcher systems

**Agni-5 Launcher**

- Key Features
  - Strategic Missile Program
  - Vertical Launch Mechanism for 50T Missile
  - Transporter cum Tilting Vehicle
  - All Hydraulic operation

**AAD Launcher**

- Key Features
  - Weapon Launch Platform for Advanced Air Defence Surface-to-Air Missiles & PRAHAR Surface-to-Surface Missiles
  - Canisterised Missile Launch with missile interface mechanism
  - Electro-mechanical Outrigger Jacks for Stabilisation Auto leveling of Launcher
  - Brushless DC Servo Motors
Tata Power SED’s Experience in Guns and Missile/Rocket Launcher systems

**FIXED-FIRING STAND**

<table>
<thead>
<tr>
<th>Key Features</th>
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</thead>
<tbody>
<tr>
<td>Capable to fire Charge 9 ammunition</td>
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<tr>
<td>Pneumatic Ramming with speed of 6m/sec</td>
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**105mm Field Gun**

<table>
<thead>
<tr>
<th>Key Features</th>
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</thead>
<tbody>
<tr>
<td>Autonomous Operation with “shoot &amp; scoot” capabilities</td>
</tr>
<tr>
<td>Accurate Navigation system</td>
</tr>
<tr>
<td>Hydraulic out-riggers for vehicle stabilization</td>
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</tbody>
</table>
Tata Power SED’s Experience in Guns and Missile/Rocket Launcher systems

155mm/52 Calibre MGS

**Key Features**

- **Main Weapon**
  - Barrel: 155mm/52 calibre auto-frettaged monobloc
  - Elevation: -3° to +75°
  - Traverse: +/- 40°
  - Range:
    - 31 Km with Boat Tail projectile
    - 42 Km with Base Bleed projectile
    - 55 Km with V-LAP projectile
- Laying and Navigation-Ring Laser Gyro based Inertial sensor

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L- 70 GUN UPGRADE

**Key Features**

- Supports full remote control using communication channel from Flycatcher Radar
- Thermal imaging (FLIR) with optical zoom
- Switchable composite analog video outputs, one for the thermal camera and one for the day camera
- Auto tracking
- Indigenously developed Ballistic Algorithms
Tata Power SED’s Experience on Platform stabilization

Railway Simulator-6-axis platform

<table>
<thead>
<tr>
<th>Key Features</th>
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</thead>
<tbody>
<tr>
<td>Total payload 4T Stabilized.</td>
</tr>
<tr>
<td>Program in collaboration with a foreign partner</td>
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</table>

Engineering Strategic Systems for Substantive Self-Reliance

RESTRICTED
Tata Power SED’s Ongoing Programs

UNIVERSAL LAUNCHER-AD PROGRAM

PRAHAR 8x8

Key Features
- Can accommodate 6- AD missiles
- Hydraulically controlled Positioning & stabilization system
- Integrated on a Trailer without super structure
- Jet deflector for Plume management

Key Features
- Can accommodate 2- AD & 8- MRSAM missile
- Electromechanical Positioning & stabilization system
- Integrated on a TATRA 8x8
- Jet deflector for Plume management
- Antenna Mast for Communication
ADVANCED TOWED ARTILLERY GUN SYSTEM

Key Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electro-Mechanical weapon system</td>
<td></td>
</tr>
<tr>
<td>Hydraulic automotive system</td>
<td></td>
</tr>
<tr>
<td>Burst</td>
<td>5 rounds in 30 seconds</td>
</tr>
<tr>
<td>Intense</td>
<td>15 rounds in 3 minutes</td>
</tr>
<tr>
<td>Sustained</td>
<td>75 rounds in 60 minutes</td>
</tr>
</tbody>
</table>
Naval EW Sub-systems

Ruggedized Computer for EW system for Navy
- Emulates a DEC PDP 11/34 computer
- Based on bit-slice processor technology with built-in MMU
- Used for performing search & auxiliary functions in EW system

Auxiliary Display Console for EW system for Navy
- 16” Random Scan Display with support for Tactical & F Alpha Modes
- Provision for control of jammers and associated servos
- Display of Tracks on the screen from data obtained through its DR 11 interface
- Interfaces available for external systems such as Radars, Sensors & other Data Acquisition Systems
Naval Combat System

• **Computer Complex**
  – Main computing centre
  – Processes data from ESI, DMFCs & other sources to generate a coherent tactical picture for display on the DMFC screen

• **External System Interface**
  – Single-point interface to on-board sensors, weapon control systems, Navigation Complex etc.

• **Dual Multi-function Consoles**
  – Man-Machine Interface
  – Real-time graphical / tabular display of Tactical Scenario
  – Sensor management, Navigation, Record / Replay, Alert Indications

• **DMFC Interface Unit**
  – Connectivity to other Segments thro’ dual-redundant FO ETX link
Tadpole Sonobuoys

- F size, passive omni directional expendable Sonobuoy
- Designed for launching from an aircraft flying at any altitude between 50 meters and 3000 meters and at air speeds between 60 knots and 90 knots
- Operating depth (Selectable before launch)
  - Shallow - 20 meters
  - Deep - 110 meters
- Descent time: Typically 30 sec. to 20 meters depth and 100 sec. to 110 meters depth
- Activation time: Max. 3 minutes after splash down
- Operating life: Selectable before launch from 2, 4 and 8 hours
- Floatation period: Automatically scuttling takes place in not less then 12 hours after activation
Very Low Frequency Receiver

- Customised engineering for mounting on ship and submarines
- Digital Signal processing
- Micro-processor based keyboard entry of front panel controls
- CW / FSK / MSK modes of reception
- Tele-printer interface
- Built-in loud speaker for CW reception
- Facility for connecting headphone / ext. loud speaker / Tape recorder
- Satisfactory reception when submarine is submerged
- 4-channel reception at 50-baud each
- High Sensitivity (0.05micro volt)
- Covers VLF Band 10KHz – 30KHz
- Local oscillator – Digital synthesizer
- Reference oscillator for high stability
- Frequency tuning with 10Hz steps
- Frequency Stability: $3 \times 10^{-7}$ after 10 min. warm up
CMS for Indian Aircraft Carrier P-71

• Hardware
  – Dual Multi Function Console (DMFC)
  – Vertical Remote Display
  – Radar Data Distribution System (RDDU)
  – Camera Video Distribution System (CVDU)
  – Computing Nodes – Data Servers
  – Power Supply Units with UPS
  – Simulator
  – Portable Work Stations

• Software
  – Operating System and Drivers
  – Online & Offline Diagnostics
  – Record and Replay
  – DDS Middleware
  – Fault Tolerance
  – Video Distribution

DMFC – Designed for P-71
Critical Requirement captured for Naval Platforms

The weapon System shall have following:

- Stabilization feature which enables precise firings against stationary or moving targets while the platform is on-the-move or stationary.
- In-built accurate & precise Inertial Navigation System
- Capable of year-round operations in a marine environment.
- Silent mode of operation
- Compact, lightweight, easily installed and simple to maintain
- If possible, a modular structure, enabling easy installation on various naval platforms.
# Key environmental compliances captured for Naval Platforms

<table>
<thead>
<tr>
<th>#</th>
<th>Test</th>
<th>Applicable Severities under N1 Category</th>
<th>Applicable Severities under N2 Category</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High Temp (Test No 17)</td>
<td><strong>Procedure 6, Test Condition K</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Low Temp (Test No 20)</td>
<td>Indoor / Outdoor Operating / Storage Temperature: -10°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shock (Test No 24)</td>
<td>NSS Grade II : 50g (11m sec vertical) and 22g (11m sec lateral)</td>
<td>NSS Grade I : 120g (8m sec vertical) and 70g (8m sec lateral)</td>
<td>Three shocks on each face</td>
</tr>
<tr>
<td>4</td>
<td>Vibration (Test No 28)</td>
<td>Initial resonance search and Endurance test for 40 minutes in each axis at fixed frequencies (14Hz, 22Hz and 33Hz) or at resonant frequencies for period of not exceeding two hours. Final resonance search.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Severities</strong> : 14 Hz : ±1.25mm, 22 Hz : ±0.45mm, 33 Hz : ±1.25mm</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Subsystem as a whole at rack level with shock mounts (Identical to the configuration for mounting in the Ship) will be subjected to vibration tests. In case subsystems are heavy &amp; unwieldy for vibration test, FEA results will be provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Damp Heat (Test No 10)</td>
<td>93±5% at 40°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Drip Proof (Test No 11)</td>
<td>One hour duration as per JSS 55555, 2012 procedure</td>
<td>NA</td>
<td></td>
</tr>
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### Key environmental compliances captured for Naval Platforms

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<tbody>
<tr>
<td>7</td>
<td>Driving Rain (Test No 12)</td>
<td>NA</td>
<td>Test Condition C one hour</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Tropical Exposure (Test No 27)</td>
<td>7 Cycles (7 days)</td>
<td>7 Cycles (7 days)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Mould Growth (Test No 21)</td>
<td>28 Days</td>
<td></td>
<td>Test to be carried out on parts susceptible for Fungus growth viz. Web parts, plastics, rubber, glass epoxy, etc.</td>
</tr>
<tr>
<td>10</td>
<td>Solar radiation (Test No 25)</td>
<td>NA</td>
<td>Procedure II</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Corrosion (salt) (Test No 9)</td>
<td>Procedure 1</td>
<td>Procedure 1</td>
<td>Test to be carried out on metal parts susceptible for corrosion</td>
</tr>
</tbody>
</table>
Critical Parameters of Launchers & Guns

- To maintain the positional accuracy
- Minimum backlash & structural deflections
- To take care for plume sustenance & deflection
- To sustain the firing loads
- Minimum settling time
- Controlled acceleration & deceleration in the motion of azimuth and elevation
- EMI / EMC compliant as per MIL STD 461E/F
Payload Stabilization

• Operational flexibility to meet demanding requirements
  – Fast reaction time
  – Roll, Pitch and rate gyro sensors
  – Quick reaction Servo actuators
  – Wind & Ship velocity sensors
  – Controller to withstand disturbances due to firing thrust, sea states, EMI/EMC compliant
Payload Stabilization for Canisterised Missiles
Thank You

वन्दे मातरम्

We take pride in...

Engineering Strategic Systems for Substantive Self-Reliance

स्वावलंबन के पथ पर अग्रसर

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