

Eol-Ref.: Q/AI/2020-21/UGV

Date: 12-07-2021

Expression of Interest for collaboration for development, co-production and Supply of Artificial Intelligence (AI) based mini/micro type Unmanned Ground Vehicle (UGV) to Indian Army (MoD/ MHA).

(Response to Eol to be mailed to bemleoi@beml.co.in) and closing date is 2nd August 2021 , Time : 17:00 Hrs) with Eol ref Q/AI/2020-21/UGV in the subject

1.0 Back ground:

BEML Limited is a leading multi-technology and multi-location Mini-Ratna category-I company under the Ministry of Defence. BEML is operating its business in three verticals viz., Defence & Aerospace, Mining & Construction and Rail & Metro. It offers high-quality products for diverse sectors of economy, such as coal, mining, steel, limestone, power, irrigation, construction, road building, aviation, defence, metro and railways. It has emerged as the forerunner of heavy engineering industry with a track record of growth and revenues for over five decades.

The company has state-of-the-art manufacturing facilities at Kolar Gold Fields, Mysuru, Bengaluru and Palakkad, all possessing ISO 9001-2015 and ISO 14001 (HSC) certifications. BEML has its own world-class composite R&D establishment for Design & Development of products.

The Company has a nationwide Marketing Network and an International Business Division for Exports activity.

Details of BEML Ltd are available at www.bemlindia.in

2.0 Overview of BEML Capabilities:

BEML Limited, a Central Public Sector Enterprise under the Ministry of Defence was incorporated in 1964. Subsequently it became a listed company and is engaged in the design, development and manufacturing in the areas of Mining & Construction, Defence & Aerospace and Rail & Metro equipment.

2.1 Mining & Construction:

BEML Ltd is engaged in the business of Hydraulic Excavators, Bulldozers, Wheel Loaders, Wheel Dozers, Dump Trucks, Motor Graders, Pipe Layers, Tyre Handlers, Water Sprinklers and Backhoe Loaders to customers in the Mining and Construction segments.

BEML has also developed Mining Dump trucks of 150 Ton and 205 Ton class and Excavators of both Hydraulic and Electrical of 180 Ton capacity.

2.2 Defence & Aerospace:

BEML Ltd is engaged in the business of High Mobility vehicle for all terrain operations, Heavy Recovery Vehicle, Pontoon Mainstream Bridge Systems, Crash Fire Tenders, Mobile Mast Vehicle, Engineering Mine Ploughs, Tank Transportation Trailers, Weapon Loading equipment, Armoured Recovery Vehicle, Milrail Coaches

and Wagons, ground support vehicles and other products to the Indian and other Armed Forces.

2.3 Rail & Metro:

BEML Ltd is engaged in the business of Integral Rail Coaches, Overhead Inspection Cars, AC/DC Electrical Multiple Units, Stainless steel EMUs, Utility vehicles, Track Laying Equipment, Broad-gauge Rail bus, Treasury Vans, Spoil disposal Units to the Indian and other Railways.

BEML Ltd has also successfully diversified into manufacturing state-of-the-art technology stainless steel Metro Cars for various urban Metro Corporations and enjoys a dominant market share in this segment

3.0 Research & Development:

BEML Ltd has R&D establishment for Design & Development of high-tech engineering products for its three verticals. It employs over 300 professionals with high experience and skills spanning a wide range of technology areas.

The R&D establishment has CAD Centre, Fluid-power, Powerline, Structural Engineering & Material Science laboratories and is continuously engaged in New Product Development and upgradation of existing products to meet customer requirements. More than 68% of Company's Sales Turnover is through in-house developed R&D products. The R&D expenditure is around 2 ~ 3% of its turnover.

4.0 International Business Division:

BEML has a sizeable market share in export markets with exports to 68 countries across the globe. Over the years this division has exported over 1200 machines covering all the three verticals.

5.0 Objectives of the EoI:

To identify potential partners with whom collaboration can be established for development, co-production and Supply of AI based mini/micro type Unmanned Ground Vehicle (UGV) of which can facilitate surveillance, Improvised explosive device (IED) & Mine detection & Neutralisation.

6.0 Scope of the collaboration

To Design, Development, manufacturing and supply of AI based mini/micro type Unmanned Ground Vehicle (UGV), which can facilitate surveillance, Improvised explosive device (IED) & Mine detection & Neutralisation.

7.0 Technical Specifications of AI based Unmanned Ground Vehicle (UGV)

Technical Specifications:-

1	General :
a	Working time : 2 hours or more continuous
b	The mini Remote operated vehicle (ROV) to carry out explosive ordinance disposal (EOD) and surveillance of the following structures/ installations: - (i) Inside Rail/aircraft (ii) Building and installations (iii) Road & Pathways
c	The operating temperature of the mini ROV should -10°C to +55°C (Certificate from National/Internationally accredited Lab to be produced).
d	It should be EMI/ EMC compatible (certificate from National/Internationally accredited Lab to be produced).
e	Perform operation in water fording 200mm or more
f	Ditch crossing 450mm with payload
g	Obstacle crossing 250mm with payload
h	Operate in all type of weather conditions
i	Portable heavy-duty Transportation case
j	Training course at customers facility
k	Operators Manual with CD/ DVD containing video of operation
2	Measurements :
a	Max. Width : <= 500mm
b	Max. Height : <= 900mm
c	Max. Length : <= 1200mm
d	Weight: <= 100 Kg with battery, excluding accessories/attachments and base station
3	Drive System :
a	Six Rubber Track (Including Four Flippers)
b	Stair climbing : Climbs stair up-to slope of 30 deg
c	Drag capacity: 85 kg or more
d	On the spot turning
e	Powerful and Effective breaking system keeping ROV steady on inclines 30 deg or better
4	Robot battery pack:
a	Rechargeable Li-Ion batteries
5	Control Unit:
a	Compact, Lightweight and Hand held with 10.1" screen
b	Multi-functional & simultaneous control by joysticks
c	Bright daylight readable LCD Screen 10.1"

d	The display unit at base station should have LCD/LED screen of minimum 10.1” with capability of simultaneously displaying at least 04 board cameras on one screen and each camera output separately on the screen.
e	Should have inbuilt safety features.
f	Connected via wireless & 200m fibre optic cable with Motorized/Self-retractable cable assembly.
g	Should have min. 3-control speeds
h	Video Output to auxiliary monitor via Ethernet
i	Audio output via headphone
j	Capability to listen and record voice signature being picked up by the microphone on board the ROV
k	All weather resistant
6	RF System :
a	Encrypted Wireless system
b	Data and video transmission via Ethernet interface
c	Use of coded orthogonal frequency division multiplexing (COFDM) technology in data, audio and video transfer between the ROV and the base station.
d	It should have a sensitive micro phone to pick up acoustic signature within radius of 15 feet
e	Radio control in urban/built up area : 100m (N-LOS)
f	Radio control in open area: 300m (LOS)
g	Capability to take the X-ray with X-ray mount assembly/real time viewing systems.
7	Turret and Arm :
a	The mini ROV should have lifting capability up to 10 kg with telescopic boom fully extended.
b	DOF: 6 Axis
c	Integrated telescope boom of mini ROV which can extend min. 1m and max. 2m or more from the ground/floor level
8	Shoulder rotation :
a	0 - 80 degree rotation or better
9	Elbow rotation :
a	0 - 270 degree or better
10	Claw :
a	360 degree rotation.
b	Claw capable to Open, Close, Lift, Carry, Twist, Drag etc
c	Set of Tools of Claw including: Glass breaker, Tire deflator, Box Cutter, Pipe Holding Grip, Spike Grip, Beak Grip and Line for Towing vehicle.
11	Lift capacity:
a	8 kg – with fully extended Arm
b	Vertical reach : 160 cm or better
c	Horizontal reach: 110 cm or better
12	Camera :
a	Front drive colour camera with LED light
b	Rear drive colour camera with LED light
c	Claw camera colour with LED light
d	Front video camera with IR capability and range of min. 3 mtr

e	Rear video camera with IR capability and range of min. 3 mtr
f	Weapons Camera: Aim with the help of both the camera and the laser aiming pointer for aiming recoilless disruptor.
g	Transmission of video image 100 mtrs NLOS and 300 mtrs LOS.
h	Capable of simultaneous viewing of 4 cameras on screen or single camera feed at a time.
i	Capable of recording up to 120 GB or better of video and audio on an HDD and SD card memory storage with USB 2.0 PC interface – MPEG-4, JPEG capable.
j	PIP capability
13	PTZ camera :
a	Pan-Tilt-Zoom colour camera motorized
b	10X optical zoom.
c	360 degree continuous rotation
d	Camera having PAN (0-360 deg) & tilt (-15 to 45 deg).
14	Lights:
a	Powerful LED lights mounted for driving front & rear
15	Trigger system:
a	01 or more circuits
16	Mounts:
a	X-Ray mount: X-Ray mounting bracket
b	Disruptor mounting bracket for Recoilless Disruptor
c	Modular mount for weapon system (SMG MP5 & Shot Gun)

8.0 Presentations on proposed Solution/ Methodology

The firms shortlisted based on the eligibility criteria may be invited to make a presentation at a date, time and location notified by BEML. The purpose of the presentation would be to allow the participants to present their solution/ methodology, experience, capabilities, infrastructure, and other key points, if any.

9.0 Benefits of partnering with BEML

BEML Ltd has an extensive Marketing network and service centres. BEML has a strong R&D in all business verticals which have developed high end Mining and Construction equipment such as 150 & 200Ton Dumpers and 180Ton Excavators etc. BEML have delivered more than 1600 Metro Cars and have a dominant market share in the Indian Market. BEML Limited keeps the Indian Army and other defence forces abreast with state-of-the-art military equipment. The company manufactures variants for all terrain operations including Bridge Layer, Field Artillery Tractor, Medium & Heavy Recovery Vehicle, Pontoon Mainstream Bridge Systems, Crash Fire Tenders, Mobile Mast Vehicle, etc.

BEML also supplies Engineering Mine Ploughs, Tank Transportation Trailers and Weapon Loading equipment, Armoured Recovery Vehicle, Mil-rail Coaches and Wagons. BEML plays a stellar role in the country's Integrated Guided Missile Development Project by supplying ground support vehicles.

With extensive manufacturing facilities spread across India, a highly skilled and experienced manpower, presence and reach through its wide network of offices and divisions in India and a successful model of collaborating with other reputed OEMs, BEML is ideally placed to be the partner of choice in India for cooperation.

10.0. Eligibility Criteria:

Sl. No. from 1 to 17 of Annexure-A are the mandatory conditions to be fulfilled by the firm for responding to the Eol.

11.0 The firm shall be ready to share complete technical details including software, hardware and engineering details to BEML Ltd for ensuring seamless support to customers. Further firm also shall provide continuous support to BEML LTD and its customers for the period of minimum 10 years

a. Capability to furnish Bank guarantees

12.0 Submission of the EOI

The EOI shall be submitted on or before **17:00 hours of 2nd August 2021** with all the formats duly filled. Eol in sealed covers stating compliance to all the points (Annexure-A, B, C, D) *should be sent by e mail to **bemleoi@beml.co.in***

Any clarification contact below;

General Manager – Corporate Materials

BEML Soudha,
BEML LTD, SR Nagar, Bangalore
Karnataka, India.

Tel (Off): +91-80 22963179

E mail : gmcm@beml.co.in

For Technical clarification, please contact

General Manager – Innovation Cell

Contact number: 080-22963192,

email id: gmic@beml.co.in

Note:

- a) SL. No. 1 to 17 of Annexure-A are mandatory terms. If bidder is not complying for these clauses or not uploaded required documents, their bid will be rejected.
- b) SI. No. 1 to 19 of Annexure-D are non-mandatory and also to be uploaded. In case any document / clarification required by Technical Evaluation Committee for these non-mandatory clauses, the same shall be asked from the bidders.

ANNEXURE-A

INFORMATION SOUGHT ON ELIGIBILITY CRITERIA:

The firm should have the followings:

Sl. No.	Parameter	Unit	Details
1	Firm should be registered Company in India	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
2	Prior experience with explosive ordinance disposal (EOD) / Surveillance Robots	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
3	Should have demonstrable experience of developing/ customizing UGV.	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
4	Minimum experience of 5 years	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
5	Has minimum 20 employees	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
6	Has an active Indian operation and service support team in India.	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
7	Willingness to modify the equipment to the customer's need.	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
8	The firm shall accept co-branding of the product.	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
9	Willingness for BEML to have the sole right to market the customised product.	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
10	Willingness to Transfer the Technology (ToT) to indigenise at least 50% of the value of equipment in India to meet "Make in India" criteria as per 'Buy & Make (Indian)' category.	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
11	Willingness to share with BEML any up-gradations / improvements made during the period under which the joint working arrangement is effective.	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
12	Willingness to train a core technology team of Engineers from BEML Ltd.	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>

Artificial Intelligence based Unmanned Ground Vehicle (UGV)



13	Firm shall present minimum Two PO from DRDO/ defence agencies to whom they have supplied the technology. Firm shall also produce customer certificates indicating that they have successfully delivered the project.	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
14	The firm shall be an OEM or Information Technology (IT) company having track record in AI based products/Technology. <i>Only the OEM needs to respond to this EOI.</i> Dealers/distributors/agents need not respond	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
15	Submission of Undertaking as per Annexure-B regarding that the company has not been debarred / blacklisted by PSU/Government of India / any State Government in India / Central or State Government undertaking for corrupt or fraudulent practices or non-delivery, non-performance (Annexure-B to be uploaded).	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
16	Submission of undertaking as per Annexure-C regarding number of arbitration cases pending and details regarding the same. (Annexure-C to be uploaded)	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
17	The firm should have certified ISO 9001:2015 & CMMI Level 3 Company. (Certificates are to be uploaded)	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/> List of certificates: (i) (ii) (iii) (iv)

Note: Please tick the relevant boxes and provide the information. Documents required to authenticate the above information/details may be enclosed/ uploaded.

ANNEXURE-B

UNDERTAKING

This is to certify that _____ (Name of the Firm) has not been banned / blacklisted / debarred from Trade by any PSU/Government of India / Autonomous Institution/any State Government in India / Central or State Government undertaking for corrupt or fraudulent practices or non-delivery, non-performance

I / we hereby certify that all the information given above is factual.

Signature with date of Authorized Signatory

Name: _____

Designation: _____

Firm's Seal: _____

ANNEXURE-C

UNDERTAKING

This is to certify that _____ (Name of the Firm) has _____ number of arbitration cases pending and details regarding the same is furnished below.

- 1.
- 2.
- 3.

I / we hereby certify that all the information given above is factual.

Signature with date of Authorized Signatory

Name: _____

Designation: _____

Firm's Seal: _____

Annexure-D

Technical Compliance check sheet for UGV (to be uploaded)

Please tick the relevant.

Compliance to Technical Parameters		
Sl. No.	Parameter	Compliance
1	UGV with battery 100 kg excluding base station and accessories	Yes/No
2	Tracked based (Min. Four Flippers and Two tracks for Drive)	Yes/No
3	Drag Capability 85 kg	Yes/No
4	Fixed Arm having reach of min. 1m or Max. 2.4m	Yes/No
5	Compact Size max.(500x900x1200)mm (Width x Height x Length)	Yes/No
6	Lifting Capability of Arm 10 kg	Yes/No
7	Base Station Hand Held	Yes/No
8	Base Station Display 10.1”	Yes/No
9	Capability to Display the feed of four Camera at Time	Yes/No
10	Range NLOS 100m and LOS 300m	Yes/No
11	Capability to mount water jet disrupter (WJD)	Yes/No
12	Capability to Mount X-Ray	Yes/No
13	Encrypted Wireless System with COFDM Technology	Yes/No
14	Two-way Audio Communication	Yes/No
15	Provision of Motorized/Self retracted optical cable for Communication	Yes/No
16	PTZ camera with 10X Optical Zoom	Yes/No
17	Demonstrate and ensure satisfactory and consistent Autonomous & remote function in BEML and at customer site with various working profiles	Yes/No
18	Vendor shall be willing to share Transfer of Technology (ToT), Bill of materials, Technical details of components used, O&M manuals & Service Manuals	Yes/No
19	Vendor to provide exhaustive training at BEML Ltd. & site location	Yes/No