

Ref : EOI/KGF/R&D/HMV 12X12

Dt : 02 March 2022

**M/s. BEML LIMITED,
BEML SOUDHA,
SAMPANGIRAMNAGAR ,
BENGALURU - 560002**

Invitation for Expression of Interest (EOI) for Partnership for development and supply of Aggregates/Sub-systems under the "Make in India" policy for BEML High Mobility Vehicle (HMV) 12x12.

Eoi Reference	Ref. No. EOI/KGF/R&D/HMV 12X12
Eoi closing date	Closing date : 4th April 2022, Time : 17:00 Hrs
Eoi response mail Id	bemleoi@beml.co.in
Contact for technical clarifications	Name: Mr. Ramesh Raju DGM(R&D) email: gawrr@beml.co.in Contact No.:08153 279196 / 7
PLEASE MENTION Eoi Reference in e mail subject	

Expression of Interest (Eol) for Partnership for development and supply of Aggregates/Sub-systems under the "Make in India" policy for BEML High Mobility Vehicle (HMV) 12x12.

Objective: "Make in India" and Self Reliability

BEML Ltd is seeking development and technology partnerships with reputed OEMs/Aggregates manufacturers who are looking to establish and/or expand their supply chains/manufacturing base in India for the manufacture of various goods and/or service business in the areas of Defence & Aerospace, Rail & Metro, Mining & Construction, Engines and aggregates with the overarching objective of "Make in India" and enhancing Self-Reliance in line with the vision of Honorable Prime Minister of India.

1.0 Back ground

BEML Ltd has three business verticals viz Defence & Aerospace, Rail & Metro and Mining & Construction with four manufacturing complexes located at Bengaluru, Kolar Gold Fields (KGF), Mysuru and Palakkad.

All the manufacturing divisions of BEML have been accredited with ISO 9001 - 2015 and ISO 14001 (HSC) certification. 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 the BEML Ltd is available on www.bemlindia.in

2.0 Overview of BEML Capabilities:

BEML Limited, a Central Public Sector Enterprise coming 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 Defence & Aerospace, Rail & Metro and Mining & Construction equipments.

2.1 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.

2.2 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.

2.3 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 200 Ton class and Excavators of both Hydraulic and Electrical of 180 Ton capacity.

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 65% 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 BEML Ltd seeks partnership with reputed OEMs/Aggregate manufacturers for HMV 12x12 vehicle

BEML is developing Indigenous High Mobility Vehicle (HMV) 12x12 On-road / Off-road of GVW 54 / 62 tonne to work in the designated area of hard terrain, difficult climatic (-20 degree to +55 degree (operating) & -30 degree to +70 degree (stowage)) and environment conditions.

This vehicle have all-wheel drive and independent suspension, ABS brake system, front and rear wheel steering and have modular powertrain configuration for sub variant development.

Business prospects: after the successful completion of development and testing, the expected quantity for further production is 40 nos.



HMV 12x12 (Illustrative Image)

6.0 EOIs invited for the development and supply of major sub-systems listed below

I) ENGINE

The engine shall meet specified performance and environmental requirements.

a) Desirable features of Engine:

- Water cooled.
- Direct injection
- Turbo-charged
- Charge air-cooled
- Electronically-controlled,
- On-board diagnostic
- Drive by wire
- EURO-III/ BS III/EPA 1999/ Equivalent(Minimum) with on-road certification
- Fuel - Diesel (DHPP (N))
- Air compressor – 1 No. for Air Brake System, CTIS & auxiliary systems.
- Exhaust brake.
- Serviceability at slopes: 30° in all directions

b) Specification:

- Max. rated power : 500 HP (min) @ about 1800 to 2000 rpm (Higher HP engine, set to deliver required Power will also be considered)
- Max. Torque: 2000 Nm (min) @ about 1200 to 1500 rpm.

c) Engine cooling system: Air/Water cooled. Cooling package to be mounted behind cabin with minimum space to get maximum platform length.

d) Provision for setting engine/PTO speed is required (in cabin).

II) TRANSMISSION :

Transmission matching with engine output & desirable performance characteristics, to be provided. The special feature of transmission shall be as follows:

- a) Fully automatic power shift transmission, electronically controlled.
- b) With torque converter equipped with lockup clutch or Transfer Case.
- c) Lockable torque divider front to rear axles incorporated inside transmission.
- d) Secondary steering pump installed at transmission.
- e) Min. 6 forward and one reverse gear ratios.
- f) Coverage ratio of approx. 12.

- g) Torque converter: Single-stage/ multi-stage matching to the gearbox. Stall torque ratio: Suitable based on drive line ingredients selected.
- h) Provision of PTO – 2 Nos. (One No. PTO for Hydraulic system pump, 1 No. for running alternator. Both will be operated individually or simultaneously in static condition).
- i) 6 forward & 1 reverse (preferred minimum) (more gear ratios available with standard GB will be acceptable).
- j) Retarder - Integral, hydraulic.
- k) Mechanical ratio: Suitable to achieve specified performance.

III) POWER TAKE OFF (PTO):

- a) Fully indigenous or with minimum 30% indigenous content.
- b) Mounting: Side& top mounted / as available with standard automatic transmission.
- c) PTO drive rating (Static operation) :
Tapping 1 -Hydraulic - 100 kW, 1500 rpm , 600 Nm (minimum). Hydraulic pump VP1-095 (Load sensing Variable displacement) make Parker to be supplied & fitted. Duty cycle : continuous- 1 hour, Intermittent – 4 hours/day. Tapping 2- Alternator to be fitted - Alternator output rating 28 V, 250 Amps. Coupling- Mechanical (direct coupling on GB) / through hydraulic pump on GB & hydraulic motor and Alternator mounted at suitable location. Input RPM of Alternator – 2200 rpm. Duty cycle: 2 hours, Intermittent – 8 hours/day.
- d) Provision of drive selection as Tapping 1 (hydraulic) / Tapping 2 (alternator) / Tapping 1 & 2 for simultaneous operation of hydraulic drive & alternator.

IV) TRANSFER CASE

Fully indigenous or with minimum 30% indigenous content.

It shall be double speed with lockable differential gear. Electro-pneumatic operation from cabin. Main Transfer Case with High-low Reduction ratio, to suit specified gradeability and high speed requirement. Reduction ratio shall be suitable based on drive line ingredients selected.

Torque distribution ratio: 30:70 torque split with suitable matching to load condition.

It shall contain

- Dog clutch/Synchronizer to engage and disengage high and low gear with

neutral position.

- Pneumatic device to engage and disengage high and low gear.
- Direct drive coupling.
- Ground driven pump.
- Asymmetrical planetary torque divider.
- Multi plate wet type clutch.
- Hydraulic system for Control, Lubrication and oil supply gears and engaging mechanism.
- Oil circulation tube.
- Gear pump.
- Double acting piston.

V) BRAKE SYSTEM

Vehicle category	N3G
Weight distribution	Front- 2 x 8150 kg / 4 x 9000 kg Rear – 4 x 9500 kg / 2 x 13000 kg
Axle	6 axles – Front 2 & Rear 2 axles steerable
Foundation brake	S-cam brake
Tyre size	16R20

- Firm has to take up the brake system with ABS development work for HMV 12x12 vehicle.
- Brake system with ABS components preferably to be made in India.
- 3D model and 2D drawings of components to be provided for installation check.
- Brake circuit to be designed in order meet latest CMVR Norms.
- Firm has to conduct pre-homologation testing and prove the brake system as per IS:11852.

VI) AUTOMATIC SLACK ADJUSTERS

- a) The existing Manual Slack Adjuster shall be modified into Automatic Slack Adjuster by maintaining the same dimensions of 275 mm centre distance and 143 mm offset of one type and 140 mm centre distance and 29 mm offset of another type.
- b) Sizing of components shall be same as the existing one and accommodate in

the existing space envelope and design shall meet the functional requirements.

VII) STEERING SYSTEM

- a) Steering wheel at right hand side of the vehicle.
- b) Two front and two rear axles are steer-able.
- c) Hydraulic power steering.
- d) Adjustable steering wheel column.
- e) Ground driven back up steering pump.
- f) Permanent mechanical connection between steering wheel and front axle steering gear.
- g) Mechanical transfer of steering action to the rear axles.
- h) Tandem gear pump on Engine.

VIII) CTIS (Central Tyre inflation System)

- a) Fully automatic CTIS system.
- b) Driver control panel should be given with required warning.
- c) Minimum 4 pressure setting mode (Terrain selection) should be available (Road, Off road, Sand / Mud & Emergency).
- d) Tyre pressure value indication in driver control panel is desirable.
- e) CTIS components preferably to be made in India.

IX) ELECTRICAL SYSTEM

- a) The electrical equipment of HMV 12x12 contains many electrical components to drive various electrical loads.
- b) The vehicle safety, economy and easy maneuverability are secured by the electronic systems viz., Anti-Lock Braking System (ABS), Automatic Transmission controls, Electronic Engine controls, Automatic Central Tyre Inflation System (CTIS), Human Machine Interface (HMI) display, IO Module control system. Each system will be controlled by respective Control Units and will be communicated through CAN SAE J1939 communication protocol.
- c) The vehicle electrical system is 24-volts DC and for the special electrical accessories we may use voltage of 12 V DC with a rectifier of 24 V / 12 VDC.
- d) Two lead batteries are connected in series to provide the final voltage of 24 V and their nominal capacity is 200 Ahrs acts as a source of electric power to start the engine and to operate electric loads with the engine is in OFF condition.

- e) The vehicle engine is equipped with starter motor. All consumers are protected by fuses, relays located in the fuse box. The sockets viz., STANAG auxiliary start socket, Preservative charger socket, are directly operated through master cut-off switch.
- f) The supplier should have thorough knowledge on Automotive Electrical system and controls mentioned for above sub- systems. Supplier shall be capable to design and manufacture the wiring harness, procurement of electrical components, integration of electrical sub-systems. The wiring harness and electrical components shall be confirming to Automotive standards with certification / MIL standard would be desirable.

7.0 MINIMUM REQUIREMENTS FOR QUALIFYING AS DEVELOPMENT /SUPPLY PARTNER

The firms expressing interest in participating in the above design, development, and supply of one or more aggregates stated in para **six (6)** can provide their consent / proposal for the above work. The firm shall meet the following minimum requirements.

- a. The firm shall be an Indian company/Fully owned subsidiary in case of Multinational OEM
- b. The firm should not have been blacklisted by either Govt of India or BEML.
- c. The firm should have experience in design, manufacture and testing the aggregates with at least 300hp Electronic Engine, 300hp Automatic Transmission, Transfer Case Gear Boxes, brake system, electrical system, power take off for Defence vehicle application.
- d. The firm should have a design team / Application engineering team of not less than 10 engineers.
- e. The firm should be an ISO 9001 certification and established QMS.
- f. The firm should have in-house facility / collaboration for testing of aggregates which they express interest.
- g. The firm should be able to develop the one or more said aggregates and provide a commitment to supply for a minimum period of 15 years after completion of Development.
- h. The firm shall be familiar with the global practice of entering and execution of design and development of one or more said aggregates.
- i. Documents to support of the above requirements shall be provided along with the

specification including the make & model.

- j. Firm has to support for Army user trials and certification testing.
- k. For initial proto development, detailed RFP / RFQ will be issued to the qualified vendor.

8.0 HOW TO PARTICIPATE

Interested Firm having capability / capacity to develop one or more aggregate as stated in para six(6) and fulfilling above qualification criteria shall provide their willingness by indicating their technical expertise, design capability, experience in carrying out similar development activity for commercial / defence / off-road vehicle.

Contact Person

Interested parties may forward their interest by providing the details of their organization with credentials and areas of interest by e mail to bemleoi@beml.co.in please mention **Eoi reference EOI/KGF/R&D/HMV**

12X12 in subject) **on or before 04.04.2022 Time: 17 :00 Hrs**

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