Bharat Heavy Electricals Limited
(A Government of India undertaking)
ELECTRONICS DIVISION
P. B. No 2606, Mysore Road,
Bengaluru - 560 026

Notice Inviting Expression of Interest (EOI) for providing manpower for maintaining AC Locomotives

EOI REFERENCE NUMBER : 445/LOCO/EOI/01

This document contains 21 pages

DISCLAIMER

The information contained in this Expression of Interest document (the "EOI") or subsequently provided to Applicant(s), whether verbally or in documentary or any other form, by or on behalf of BHEL or any of its employees or advisors, is provided to Applicant(s) on the terms and conditions set out in this EOI and such other terms and conditions subject to which such information is provided.

The purpose of this EOI is to provide interested parties with information that may be useful in formulation of their application for qualification pursuant to this EOI.

BHEL also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused or arising from reliance of any Applicant upon the statements contained in this EOI.

The issue of this EOI does not imply that BHEL is bound to select and shortlist Applicants for next stage for providing manpower for Maintenance of AC Locomotives .

The respondent shall bear all costs associated with the preparation, technical discussion/presentation and submission of EOI. The Purchaser shall in no case be responsible or liable for these costs regardless of the conduct or outcome of the EOI process.

Canvassing in any form by the respondent or by any other agency on their behalf may lead to disqualification of their EOI.

BHARAT HEAVY ELECTRICALS LIMITED

ELECTRONICS DIVISION

Expression of Interest (EOI) for providing manpower for maintaining AC Locomotives

EOI REFERENCE NUMBER : 445/LOCO/EOI/01

CONTACT PERSON AND SCHEDULE OF EVENTS

Contact Person

Mr. Kathavarayan T

Senior Deputy General Manager (PES- Traction Services)
BHEL - Electronics Division
Mysore Road, Bengaluru – 560026 INDIA
Phone:+91 80 26989263 Mobile: +91 9945568518 email: kathavarayan@bheledn.co.in

Schedule of Events

Last date for receipt of responses from prospective technology partners:	**11-11-2016 13:00 Hrs IST**
All corrigenda, addenda, amendments, clarifications, time extensions etc. related to this EoI will be hosted on	www.bhel.com and www.bheledn.com
Mode of Submission of Documents	In sealed cover to the contact person so as to reach on or before the date mentioned above. The cover shall be super scribed with EOI Reference number and the words "Expression of Interest for providing Manpower for maintaining AC Locomotives."

Subject: Expression of Interest (EOI) for providing manpower for maintaining AC Locomotives

Due Date of submission: 11.11.2016 (Friday), 13.00 hours (Indian Time)

1) INTRODUCTION

BHEL, Electronics Division, Bangalore, a unit of Bharat Heavy Electricals Ltd, MAHARATNA Public Sector Undertaking under Government of India proposes to maintain 6000HP AC locomotives of Indian Railways. This Expression of Interest (EOI) seeks response for providing manpower support for the above work

1.1) BHEL is a leading Government of India owned Public Sector Undertaking. BHEL is an integrated power plant equipment manufacturer and one of the largest engineering and manufacturing organizations in India, catering to the infrastructure sectors of Indian economy viz. energy, transportation, industry and non-conventional energy. The energy sector covers generation, transmission and distribution equipment for hydro, fossil, and gas fuels. BHEL has been in this business for more than 50 years and BHEL manufactured sets account for nearly 70 % of total power generated in India. Nearly 68% of the equity of BHEL is owned by the Government of India. The company has 17 manufacturing units, 4 power sector regions, 8 service centers, 10 overseas offices and 15 regional offices, besides host of project sites spread all over India and abroad. The annual turnover of BHEL for the year 2015-16 **was about US $ 4.00 Billion**. BHEL's highly skilled and committed manpower of approximately **42000** employees, the best of manufacturing facilities and practices together with the latest technologies, has helped BHEL to deliver a consistent track record of performance. With the current order book exceeding **US $ 16.8 Billion*,** BHEL is poised for excellent future growth. More details about the entire range of BHEL's products and operations can be obtained by visiting our web site **www.bhel.com**.

1.2 About Electronics Division unit of BHEL

Electronics Division (BHEL-EDN) (www.bheledn.com**), a** unit of BHEL, was established in 1976 at Bangalore (India), with the objective of being a nodal agency for electronics in BHEL & to provide a strong base in the areas of Automation and Power Electronics and to supplement the Company's pioneering efforts in the above mentioned core sectors. Many of the power plants and industries in the country today are equipped with electronics products and systems that have been manufactured and supplied by BHEL EDN.

EDN supplied equipment accounts for about 63 % of total Control & Instrumentation(C&I) equipments in the country and continue to be the leader in power industry for last one decade. We also have a strong base in Traction which was started first time in INDIA by BHEL in 1983. Today EDN has an installed equpipments in more than 200 numbers of 6000HP Electric Loco for Indian Railways. We also have a good international reference by way of our exports to Europe, Middle-East and South-East Asian markets. EDN has been accredited with ISO 9001, ISO 14001 and OHSAS 18001 standard certifications.

1.3 About Experience of BHEL in Traction

BHEL has been supplying Electrics for Diesel as well as Electric Locomotive for Indian Railways.

BHEL is also involved in design, development, engineering, marketing, production, installation, commissioning, maintenance and after sales service of rolling stock and traction propulsion systems for 6000HP Electric Locos, EMUs, DEMUs, etc. for more than four decades. Regarding electric locomotives, BHEL has supplied complete AC-DC locomotives of WCAM-2 and WCM-3 and electrics for other AC and DC locomotives based on conventional DC motor drive technology to Indian Railways.

Presently BHEL Electronics division has been supplying GTO based main traction converter / Inverter, control electronics based on the design of M/s Adtranz, Switzerland for 6000HP AC 3-phase Locomotive which are being manufactured at Chittaranjan Locomotive works, Chittaranjan for more than 10 years.

Other than traction converters and control electronics BHEL – Bhopal / Jhansi unit has been supplying other electrics like auxiliary converter, 3-phase traction motor, 1-phase high impedance traction transformers, associated switchgear & control gear items, etc. for the 6000 HP AC 3-phase Locomotive.

Beside 6000 HP Electrics, BHEL has also supplied GTO based 3-phase drive electrics such as GTO based main traction converter/Inverter, IGBT based auxiliary converter, DSP based control electronics, for AC-DC EMUs which are presently in service in Western/Central Railway Mumbai in association with M/s Traxis, Netherlands.

At present after successful development of IGBT based AC drive system for 6000 HP electric loco consisting of IGBT based main Traction Inverter, IGBT based Auxiliary convertor, IEC 61375 TCN based Vehicle control Electronics for CLW and new touch screen Driver displays BHEL is the market leader in this segment.

BHEL has well established design, manufacturing and test facilities at Electronics Division, Bangalore includinga Centre of Excellence (COE) for IGBT with main

emphasis on Traction products. With this COE facility any new developments in the field of IGBTs can be taken up with ease and most importantly the COE can cater for testing of Power converters/inverters upto 1MW.

In addition, BHEL has a number of well established & specialized laboratories and a highly qualified & trained manpower at its Corporate Research & Development Division, Hyderabad, in different areas, such as, electrical machines, electro-magnetics, power electronics, mechanical design, heat transfer, vibration etc, for development of sub-systems and products, as required by BHEL Units and external customers. Using these facilities, BHEL has been the leading supplier of traction equipment to Indian Railways for the last several decades. In the field of static power conditioning equipment, BHEL is a regular supplier of the main (power) and auxiliary converters for three-phase locos (WAG9 and WAP5). All the above converters are in commercial service in Indian Railways.

The design and development efforts under taken by BHEL would reduce the dependence of Indian Railways on foreign parties for operation and maintenance of electric locomotives operating in India. In addition, Indian Railways and BHEL can carry out joint developments for continuous improvements and up-gradation of electric loco systems for use in India and also for export.

As part of BHEL's Strategy to further to go for AMC of 6000HP AC Locomotives, at Electronics Division of BHEL, Bangalore to align themselves with Indian Railways requirement of AMC for three years post warranty. As on 30th September 2016, BHEL has supplied Traction Converters, Auxiliary Converters and Vehicle Control Units in more than 200 locomotives. BHEL also working on development of AC EMU and AC-AC traction system for Diesel loco for which AMC will be required in future.

2.0 Indicative Scope of work

The indicative scope of work is for maintenance of 6000HP AC Locomotive as per the following.

The equipments covered are

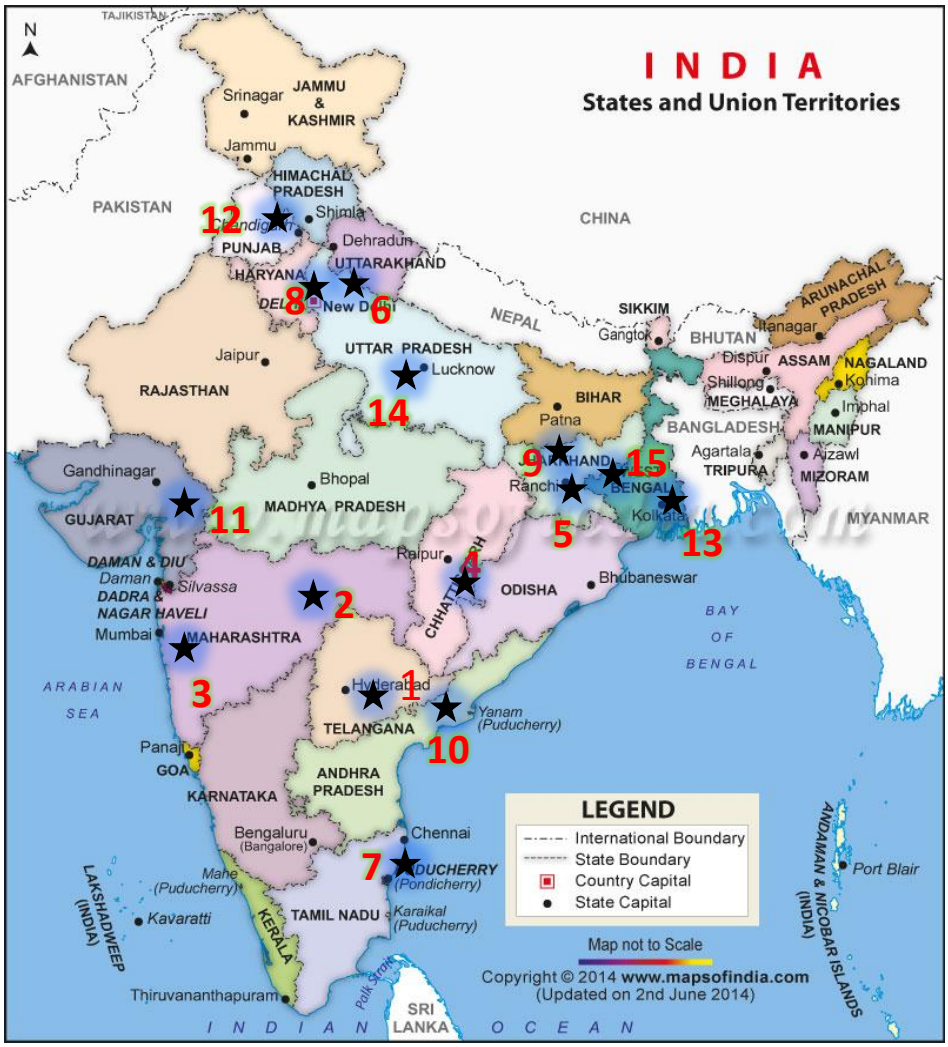
1. Traction Converters
2. Auxiliary Converters
3. Vehicle Control Unit

The sheds covered are

1. Lallaguda -Telengana
2. Ajni -Madhya Pradesh

3. Kalyan - Maharashtra
4. Bhilai -Madhya Pradesh
5. Tatanagar -Jharkahand
6. Ghaziabad – Uttar Pradesh
7. Royapuram -Tamilnadu
8. Tuklagabad -National Capital Region
9. Gomoh -West Bengal
10. Vizag - Andhra Pradesh
11. Vadodara -Gujarat
12. Ludhiana -Punjob
13. Howrah -West Bengal
14. Kanpur - Uttar Pradesh
15. Asansol -West Bengal

Interest on supporting one or more sheds to be given in the response.



The work involves providing manpower to attend preventive and breakdown maintenance at sheds and on line.

Preventive maintenance schedule

Periodicity and duration (time taken) for various schedules				
	WAP5/WAP7 locomotive		WAG9/WAG9H Locomotive	
Maintenance Schedule	**Periodicity**	**Time Taken**	**Periodicity**	**Time Taken**
Trip Inspection	3000kms. Or one trip which ever is later	2 hrs	45 days	4 hrs
IA	90 days	6 hrs	90 days	6 hrs
IB	180 days	6 hrs	180 days	6 hrs
IC	270 days	8 hrs	270 days	8 hrs
MOH	18 months	6 working days	18 months	6 working days / 8 working days for 2 nd MOH
IOH	4.5 years ± 6 months or 12 lakh kms. Which ever is earlier	11 working days (WAP7) / 20 working days (WAP5)	6 years ± 6 months or 12 lakh kms. Which ever is earlier	11 working days
POH	9 yrs. ± 6 months or 24 lakh kms. Which ever is earlier	28 days	12 yrs. ± 6 months or 24 lakh kms. Which ever is earlier	28 days

MUST CHANGE ITEMS OF WAP 7, WAG9 AND WAG9H LOCOMOTIVES.				
SN	**DESCRIPTION**	**MOH**	**IOH**	**POH**
1	**Traction Converter**			
	The rubber hoses of the power module (both inlet & outlet)	X	X	√
	The air cooling hoses, seals on the traction converter doors.	X	X	√
	Converter coolant	X	√	√
	Contact tips of Electro-magnetic contactors.	X	X	√
	Internal cooling fans.	X	√	√
	Pressure switch	X	√	√
2	**TCN based VCU and Electronics of Power Converter & Auxiliary Converter**			
	Instrument cooling fans.	X	√	√
	Replace the back-up batteries in the DDU and back-light tube	X	√	√
3	**Auxiliary Converter**			
	Gasket of CREC, ACPS and LVPS modules.	X	X	√
	Seals on the Aux. Converter cabinets	X	X	√
	Internal cooling fans.	X	√	√
	Sine wave filter capacitors	X	X	√

MINOR MAINTENANCE SCHEDULE FOR WAP7, WAG9 & WAG9H LOCOMOTIVES				
SL. No	**Equipment**	**IT**	**IA/IB**	**IC**
1	**TRACTION CONVERTER**			
	Check the coolant level indicator situated on the conservator (Expansion Tank). If the coolant is below the minimum mark-top up with the specified coolant. Check for any signs of leakage.	√	√	√

	Visually examine pipe joints for leaks, loose or missing screws and correct as necessary.	√	√	√
	Examine the two flange joints for leaks, loose or missing screws. Check gaskets/coolant seals, if dismantling is required.	√	√	√
	Examine all electrical equipment of traction converter for signs of dirt, corrosion, damage etc. Remove all dust/dirt deposits from the connection insulators. Don't open power module compartment before IOH	X	√	√
	Clean the isolating blade and spring contact of earth switch. Lightly lubricate with the specified grease.	X	X	√
	Check high voltage indicator	√	√	√
2	**AUXILIARY CONVERTER CUBICLES**			
	Check high voltage indicators	√	√	√
	All EP contactors, re-grouping contactors to be checked and replace, if found defective	X	√	√

Note	Cleaning by vacuum cleaner	X	√	√

MAJOR OVERHAUL SCHEDULE FOR WAP 7,WAG9 & WAG9H LOCOMOTIVES				
SL. No	**Description**	**MOH**	**IOH**	**POH**
1	**IGBT based Traction Converter**			
	General remark: keep power module compartement closed as long as possible, no maintenance needed before IOH			
	Inspect the cubicle with respect to mechanical and electrical integrity. Check all fixings for security and tightness and all wiring are secured and insulations are not damaged, burnt or eroded. Visually inspect all components for physical damage.	X	√	√
	Visually inspect the soft crow bar resistor for evidence of overheating, bending of resistor tapes, discoloration of the resistors or its case, or burn marks. Measure the impedance of the fault detection and MUB resistors.	X	√	√
	Visually inspect the traction converter earthing and discharge resistors for signs of overheating.	√	√	√
	Replace any resistor that is damaged or defective.	√	√	√
	Clean the series resonant and DC link capacitors.	X	√	√
	Check the DC link and series resonant circuit capacitor bank electrical connections. Tighten the fasteners if necessary.	X	√	√
	Test the voltage indicator. Replace, if required.	X	√	√
	Overhaul the pre-charging and main contactors.	√	√	√
	Replace Contact tips of Electro-magnetic contactors.	X	X	√
	Ensure sealing of incoming cable gland of control card rack to avoid dust entry.	√	√	√
	Collect the coolant sample from converter, check for pH value and composition.	√	X	X

	Check the coolant level indicator situated on the conservator. If the coolant is below the minimum mark-top up with the specified coolant. Check for any signs of leakage.	√	X	X
	Replace the coolant	X	√	√
	Examine all (external) pipe/flange joints for any leaks, looseness or missing screws. Correct if necessary.	√	√	√
	Examine all electrical equipment of traction converter for signs of dirt, corrosion, damage etc. Remove all dust/dirt deposits from the connection insulators.	X	√	√
	Replace the air-cooling hoses, seals on the traction converter doors (WAG9/WAG9H).	X	X	√
	Clean the area by lightly blowing any dirt deposit	√	√	√
	Clean power modules and replace rubber hoses (included rubber hose to conservator)	X	X	√
	Overhauling of Earthing switch. Check and clean the isolation blade and spring contacts of earthing switch and lubricate. Check its connections for tightness and intactness.	√	√	√
	Replacement of the internalcooling fans.	X	√	√
	Clean and inspect coolant pump according manufacturer information	√	√	√
	Replace pressure switch	X	√	√
2	**TCN Based VCU and Electronics of Power Converter & Auxiliary Converter**			
	General remark: Traction and auxiliary convertes don't have bus station but single board controllers, no maintenance needed			
	Visually check physical damage and insulation defects	√	√	√
	Check for loose fixing of any connection	√	√	√
	Check the tightness of all parts and cards	√	√	√
	Check the tightness of connectors.	√	√	√
	Replace the back-up batteries in the DDU and back-light tube	X	√	√

	Ensure working of instrument cooling fan.	√	√	√
	Replacement of the instrument cooling fan.	X	√	√
	Check setting of temperature sensor in (VCU only)	X	√	√
	Measure dB loss of Fiber-optic cables . Clean, if required.	X	√	√
	Clean Heat Exchangers at the back of the electronic rack.	X	√	√
3	**Auxiliary converter**			
	General remark: Aux cubicle closed as long as possible, no maintenance needed before IOH			
	Inspect the cubicle with respect to mechanical and electrical integrity. Check all fixings for security and tightness and all wiring are secured and insulations are not damaged, burnt or eroded. Visually inspect all components for physical damage.	X	√	√
	Check the security of bolted terminals and mechanical mounting of large components of Controlled Rectifier (CREC), Aux. inverter (ACPS) and Battery Charger (LVPS). Remove dust and dirt from insulating and heat convection surface.	X	√	√
	Remove dust between the fins of the modules CREC, ACPS and LVPSa	X	√	√
	Replace gasket of CREC, ACPS and LVPS module.	X	X	√
	Check high voltage indicators	√	√	√
	Check the value of DC link capacitance bank, it should be 19.8 mF. Remove dust deposits on the terminal insulators of the capacitors by blowing brushing with a metallic brush or by rubbing with a cloth.	X	√	√
	Check the tightness & proper fitment of 3 phase couplers of Aux. Converter	X	√	√
	Remove auxiliary converter cubicle, clean inside the auxiliary converter cabinets using a vacuum cleaner. Remove all traces of dust, dirt and debris from the components, cubicle walls and floor.	X	X	√

	Clean the reactors and transformers in the auxiliary converter cabinets using compressed air. Remove all traces of dirt, dust and debris.	√	√	√
	Clean all dirt and dust deposit from the terminal side of the phase reference transformer **.** Cleaning is by means of blower	√	√	√
	Visually inspect the insulators in the auxiliary converters (BUR) 1,2 & 3 for damage. Replace any damaged insulator.	X	√	√
	Visually inspect the sine wave filter for any physical damage and measure the capacitance. Replace any damaged /faulty capacitor.	√	√	√
	Replace the seals on the auxiliary converter cabinets and equipment modules.	X	X	√
	All EP contactors, re-grouping contactors and replace, if found defective	X	√	√
	Replacement of the cooling fans of Buffer and Battery Charger Module .	X	√	√

However the actual schedule of activities will be as per the tender requirements of Railways from time to time.

3.0 Prequalification requirements for the Consultant:

3.1 The consultant should have worked for maintenance of locomotive or allied areas or power electronics, UPS, AC drives or Power supplies.

3.2 The consultant should have sufficient knowledge on the equipment, utilities and facilities required for maintaining HV equipments.

3.3 Shed wise minimum of one diploma holder in Electrical or Electronics and two artisans(one electrical and one fitter) are required to be assigned.

4.0 Instructions to the respondent to EOI for submission of offer

The respondents shall submit their offers with following:

(a) Annexure-1: "Prequalification criteria" duly filled by the bidder with signature and seal.

(b) Annexure-2: Indicative Scope of work duly signed.

(c) Annexure-3: "Company profile" duly filled up by the bidder with signature and seal on each page along with required attachments, brochures, catalogues, reference lists, customer certificates and annual reports.

(d) Annexure-4: "Checklist" duly filled up by the respondent with signature and seal.

7.0 The consultant shall submit their response in a sealed cover to BHEL on or before 13.00 hours, 11th November, 2016 and the same shall be opened on the same day at 13.30 hours by BHEL. In case of any clarification, bidder may take up the same through email: kathavarayan@bheledn.co.in at least 7 days before the due date.

8.0 EVALUATION

a) The Expression of Interest (EOI) received from various agencies shall be scrutinized and shortlisted based on qualifying criteria specified in EOI. BHEL may request the shortlisted Consultants for further discussions and presentations.

b) Detailed Tendering will be done by BHEL among qualified agencies from the EOI as per BHEL policy and guidelines. Offers, thus obtained, would be evaluated as per laid down procedure to select the Consultant.

9.0 DISCLAIMER

a) The EOI does not constitute an invitation of offer in relation to the aforesaid work. This is not a contract or agreement of any kind whatsoever.

b) There may be deviations or changes in any of aforementioned information during actual tendering for the consultancy services.

Annexure-1

Pre-qualification criteria Confirmation by the responding Party

S No	Description	Response
1	Whether original manufacturer of any equipment for Indian Railways or A consultant with working experience in Railway shed and associated in maintaining any equipment in Electric locomotive. Or A consultant with working experience in power electronics	YES / NO YES / NO YES / NO Name of company: Address : Consultancy services provided so far:
2	Whether have sufficient knowledge on the equipment, utilities and facilities required for maintaining electrical equipments.	YES / NO

Authorized Signature

Annexure-2

Indicative Scope of work

We (Consultant) confirm that we can offer manpower support to BHEL for maintaining 6000HP AC Locomotive for the following equipments.

1. Traction Converters
2. Auxiliary Converters
3. Vehicle Control Unit

In the following sheds.

1.
2.
…

Authorized Signature

Annexure-3

Format for filling up Company Profile

1.0	**General information**	
	1.1 Name of company	
	1.2 Address: Telephone: Fax: E-mail: Website:	
	1.4 Chief Executive:	
	1.5 Contact person(s) Name(s): Official capacity: Address: Telephone: Fax: E-mail:	
	1.6 Year of establishment of the company	
2.0	**TECHNICAL/COMMERCIAL INFORMATION:**	
2.1	If manpower supply company, Engineers: Technicians: **Attach company profile, product profile, technical brochures / catalogues.**	
2.2	If consultant with working experience in Indian Railways associated with HV equipments Details of working experience with Indian Railways : Manpower Services offered so far :	

	Attach details of experience.	
3.0	**FINANCIAL INFORMATION:**	
3.1	Physical and annual turnovers, and profit-after-tax for last 3 years: (Attach copies of audited Balance Sheet and P&L Account) Year-1: Year-2: Year-3:	

Authorized Signature

Annexure 4

CHECK LIST

Sl. No.	Description	Whether submitted
1	Covering letter signed by an authorized signatory on company letter head listing clearly the enclosures	YES / NO
2	Details as per Annexure 1- PQC Criteria	YES / NO
3	Details as per Annexure 2- Indicative Scope of Consultancy	YES / NO
4	Details as per Annexure 3- Company Profile	YES / NO

Authorized Signature