Expression of Interest

For Reconditioning and Retrofitting of Precision Heavy Duty Lathe, Model – KS1614, Make – M/s Kramatorsk Heavy Machine Tool Works, USSR; Plan No. – 2-182, Block-3

Bharat Heavy Electricals Limited (HEEP)
Haridwar, Uttarakhand

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.

This EOI is not an agreement and is neither an offer nor invitation by BHEL to the prospective Applicants or any other person. The purpose of this EOI is to provide interested parties with information that may be useful to them in the 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 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 or to enter into any agreement with shortlisted Applicants for the Project.

1.0 INTRODUCTION:

1.1 Background:

1.1.1 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. The transportation sector covers propulsion systems for Electric locomotives, Motors, alternators and transformers and electric locomotives up to 5500 HP. Nearly 63% of BHEL's equity is owned by the Government of India.

1.1.2 BHEL has been in this business for over 45 years and BHEL supplied equipments account for 64 % of the total thermal generating capacity in India. The company has 15 manufacturing units, 4 power sector regions, 8 service centres, 10 overseas offices and 15 regional offices, besides host of project sites spread all over India and abroad. BHEL's highly skilled and committed manpower of approximately 49390 employees, the best of manufacturing facilities and practices together with the latest technologies, has helped BHEL to deliver a consistent track record of performance. More details about the entire range of BHEL's products and operations can be obtained by visiting our web site **www.bhel.com.**

1.1.3 The Heavy Electricals Equipment Plant is one of the major manufacturing units of BHEL. The core business of HEEP includes design and manufacture of large size steam and gas turbines, turbo generators, heat exchangers, condensers and auxiliaries. Huge nos. of machines are used in the plant to manufacture variety of capital goods and products. With a view to restore the accuracies of ageing Machine tools / Equipments and upgrade them suitably with state of the art technologies wherever possible BHEL aims to extend the useful life of plant & Machinery and to upgrade Plant & Machinery technologically.

1.1.4 In line of above objectives BHEL is planning for Reconditioning and Retrofitting of Precision Heavy Duty Lathe, Model – KS1614, Make – M/s Kramatorsk Heavy Machine Tool Works, USSR; Plan No. – 2-182, Block-3, HEEP, Haridwar. For the same BHEL intends to get this work done by a qualified party/ vendor as per indicative scope of work given in Annexure below.

1.1.5 BHEL shall receive Applications pursuant to this EOI in accordance with the terms set forth herein and all Applications shall be prepared and submitted in accordance with such terms on or before the date specified in this EOI for submission of Applications.

1.2 Brief Description of EOI Process:

1.2.1 The EOI process involves Pre-qualification of interested parties who make an application in accordance with the provisions of this EOI (the "Applicant"). In this process, BHEL expects to short-list suitable pre-qualified Applicants for further deliberations and negotiations to finalize the Final Scope Of Work.

1.2.2 Shortlisted vendors shall be considered and asked to submit firm technical bids and price bids in second stage of tendering through Open/Limited tender as may be decided by BHEL.

1.2.3 Vendors are strongly advised to visit the site and see machines and machine documents before submitting their bids

1.2.4 The EOI can be submitted by hand or sent by Registered Post so as to reach before 01:45 PM on Sep 05, 2014 at the following address. A signed copy of the EOI may be sent by e-mail also.

"TENDER ROOM, PPX,
4th FLOOR, MAIN ADMINISTRATIVE BUILDING,
HEEP, BHEL, HARIDWAR,
UTTARAKHAND-249403"
Email ID – harora@bhelhwr.co.in

1.2.5 Any request for further information or clarification on the EOI document may be submitted in writing to Sr. Engineer (MCR) at the above Email ID. BHEL may respond to the queries raised/clarifications sought to the best of its ability. However, no extension of the time or date of EOI submittal would be granted on the ground that BHEL has not responded to any query/clarification raised by any party. BHEL at its discretion may extend the due date for submission of EOI and the decision of BHEL in this respect would be final & binding on the respondents.

1.2.6 No oral modification or interpretation of any provisions of this EOI shall be valid. Written communication shall be issued by BHEL when changes,

clarifications or amendment to the EOI document is deemed necessary by BHEL at its sole discretion.

1.2.7 EOI submittals should be in English. Duly authorized representative shall sign on each page of the documents. Emphasis should be on (a) conformance to EOI instructions; (b) responsiveness to the EOI requirements; (c) completeness and clarity of content.

1.2.8 If at any time during the evaluation of EOI, BHEL requires any clarification on the documents submitted by the prospective parties, it reserves the right to request a clarification so as to complete the evaluation.

1.2.9 EOI which is found to be incomplete in content and/or attachments and/or authentication etc. is liable to be rejected.

1.2.10 No price bid is to be submitted against Expression of Interest.

2.0 Eligibility of Applicants (Pre-qualification Criteria):

Offers shall be considered only of those vendors/ manufacturers who meet the below mentioned criteria:

2.1 Experience of having successfully completed "similar work" during last 7 years ending on 30th July 2014.

Definition of "Similar Work":

Similar works means either of the following:

A. Reconditioning and Retrofitting of a Lathe of minimum 15 Tons Headstock capacity and longitudinal carriage traverse of minimum 4000mm including reconditioning/ replacement of spindle unit and installation of new main spindle bearing.

B. Reconditioning and Retrofitting of a Vertical Borer of minimum 2500mm table diameter and minimum 2500mm of turning and facing height including reconditioning/ replacement of spindle unit and installation of new table bearing.

C. Reconditioning and Retrofitting of a Horizontal Borer of minimum spindle diameter of 160mm and longitudinal column traverse of

minimum 4000mm including reconditioning/ replacement of spindle unit and installation of new main spindle bearing.

2.2 The machine builders who have designed, manufactured and commissioned any machine of the above specifications during last 7 years ending on 30th July 2014 may also submit their offers.

2.3 Documentary evidence such as P.O. / W.O. Copies giving scope of supply and scope of work, final MOM and performance certificate shall be submitted as part of 'Expression of Interest' in support of Pre-Qualification Requirements.

2.4 The machine(s) whose documentary evidence has been submitted by the vendor as per Para 2.3 above should be running satisfactorily at his customer's premises on the date of publishing of notice inviting 'Expression of Interest'.

2.5 Vendor shall submit copies of audited balance sheets of the last 3 financial years ending 31st March or 31st December or as the case may be.

2.6 Customer's details such as Name, Address, Telephone No., FAX No., email ID shall be submitted by the vendor along with documentary evidences as per Para 2.3. BHEL reserves the right to verify the information provided by the vendor with the vendor's customers directly. Vendor shall also agree to facilitate the visit of BHEL engineer(s) to his customer's premises, if considered necessary by BHEL. Travel, boarding and lodging expenditure for such visits shall be borne by BHEL.

2.7 **The vendor shall do all the work of Reconditioning and CNC Retrofitting inside the territory of India.**

Indicative Scope of Work

MACHINE OVERALL DIMENSIONS:

Length (mm)	13900
Width (mm)	3845
Height (mm)	2865
Weight of the machine (Kg)	54500

MACHINE SPECIFICATIONS:

Maximum swing over bed (mm)	2000
Maximum diameter of work over the saddle (mm)	1500
Distance between Centers at extreme position of the tailstock (mm)	8000
Maximum length of machining over the saddle (mm)	8000
Diameter of spindle bore (mm)	80
Maximum taper when machining by the method of combined feeds	0.15
Maximum length when machining by the method of combined feeds (mm)	1200
Max Wt of the job to be machined (Kg)	20000
Maximum displacement of the tailstock spindle (mm)	260

HEADSTOCK

Spindle motor: DC 55 kW, 300-1500 RPM

Speed box has three mechanical steps:-

Step	**Spindle RPM**
Step 1	1.6-8
Step 2	8-40
Step 3	40-200

Shifting of mechanical steps is effected by means of hydraulic cylinders in the speed box.

CARRIAGE AND SADDLES:

There are two carriages on the machine.

Each of the machine carriage is equipped with two coupled saddles (i.e. front and rear saddles are installed on each carriage).

Displacement of transverse slide of the saddle in mm (powered and manual both) 1130

Displacement of longitudinal slide of the saddle in mm (powered and manual both) 600

Displacement of tool slide in mm (only manual) 150

Rapid traverse rates (m/min):

Carriage 2.02

Transverse slide 1.03

Longitudinal slide 0.48

Feed drive:

Feed drive is affected by the spindle via the gear system to the feed shaft of the lathe.

SCOPE OF WORK:

Sl.No	SCOPE OF WORK	Vendor's Offer as agreed/not agreed and Deviation
A.	MECHANICAL	
1.	Following work shall be carried out by the Vendor with his personnel and measuring instruments before dismantling of the machine for Reconditioning work. ❖ Measurement and recording the geometrical accuracies as per manufacturer's test charts ❖ Observing and noting vibrations, noise from machine or any part there of 1st Joint Inspection at BHEL, Hardwar to determine the parts/assemblies to be sent to vendor's works for repair and reconditioning.	

2.	Removing parts/assemblies of the machine at site at BHEL whose reconditioning shall be done at vendor's works; dismantling into transportable lots for further transportation to the vendor's works. Necessary personnel and tools shall be in vendor's scope.	
3.	Unpacking the transported parts/assemblies at vendor's works, complete dismantling into individual items, de-greasing, chemically cleaning; pre-painting of structural parts. Second Joint Inspection shall be carried out at Vendor's works to finalize the detailed list of spares and work required for the machine. Vendor shall submit a quotation for such identified parts and required work to BHEL. Prices shall be approved by BHEL subject to price reasonability following which placement of a separate order/amendment to the Work Order shall be done by BHEL. BHEL may procure these identified parts from any other source as well and supply these items to the vendor who shall install these parts on the machine during reconditioning.	
4.	Spindle shall be repaired and its taper shall be restored. Spindle may have to be replaced, if found necessary. Decision on new spindle shall be taken during Joint Inspection.	
5.	Replacement of all bearings of spindle with SKF/ FAG/ TIMKIN/ RHP-make only. Bearings shall be procured from either bearing manufacturers or their authorized representative only. Details such as Invoice from OEM, valid authorization from bearing manufacturer and Test Certificate AND Guarantee Certificate of bearings from original manufacturer are essentially required. The list of bearings is enclosed in Annexure-I. Bearings other than those in the list are to be identified in Joint Inspection after complete stripping off of the machine and shall be replaced.	

6. (i)	Examination, overhauling and complete restoration of the headstock, its gear train, shifters, hydraulic cylinders, etc and the overall lubrication and hydraulic system of the headstock	
(ii)	Replacement of all worn out gears (as decided during joint inspection) with new ones as per specified quality materials complying with the original manufacturer's specified tolerances.	
(iii)	Headstock lubrication to be ensured as per original schematic and pressure switches, lubricating pipes are to be replaced, wherever necessary. Incorporation of filter with electronic clog indicator/differential pressure switch shall be made. The same shall be monitored in the PLC.	
(iv)	An electronic flow switch of Türck make showing flow rate digitally shall be provided for headstock lubrication and hydraulic gear change purpose. This flow switch shall be monitored in the PLC.	
(v)	Digital display of pressure is also required.	
7.	All Faceplate jaws (4 nos.) shall be replaced with new ones.	
8.	Lead screw-nut and feed rod assembly of each carriage shall be overhauled and restored. If required, these shall be replaced with new ones subject to decision during the Joint Inspection.	
9.	Reconditioning of both the carriages shall including the reconditioning of following:	
i.	Transverse, longitudinal and tool slides of the saddles	
ii.	Longitudinal rack and pinion drive mechanism of the carriages.	
iii.	Replacement of all worn-out clutches of the carriages/saddles.	
iv.	Replacement of all worn out gears in carriages and saddles with new ones as per OEM standards and of specified quality materials complying with the original manufacturer's specified tolerances.	
v.	Telescope covers for transverse traverse (X-axis) of saddles shall be provided.	
vi.	In lieu of work/material specified at 9 (i) to (vi), vendor may quote absolutely new carriages.	

10.	Reconditioning of the guideways/slideways: Guideways of X-and Z-axes shall be ground, scraped and blue-matched. Machine tool-grade antifriction bearing material such as Teflon sheet, Turcite-B/Biplast/tin bronze shall be incorporated of all slides after removing the existing material. Scraping of all sliding parts like gibs etc shall be carried out as required.	
11.	Reconditioning of Steady Rest: Reconditioning of Steady Rest including all the quills, bushes, rematching steady rest bottom with the machine guideways is required. Ribs on the sides of steady rest (to prevent oil overflow) shall be restored.	
12.	Installation and mounting of a new AC spindle motor with encoder feedback after replacing the existing DC motor. Modification of base, brackets and couplings (including pulleys) for mounting of the new AC spindle motor.	
13.(i) (ii) (iii) (iv) (v) (vi)	A new Gear pump for apron (5 lpm, 5 kg), a new Gear pump for bed (18 lpm, 13 kg) and a new Gear pump for steady rest (5 lpm, 5 kg) shall be installed and commissioned. All pumps are required with new motors. Monitoring of oil pressure and flow is required in the PLC. All defective hydraulic devices and components such as valves, pressure switches, float switches, oil filter supervision devices, hydraulic hoses shall be replaced. All seals, O-rings, wipers and rubber packings shall be replaced. Hydraulic oil leakages around the machine and headstock are to be arrested Hydraulic components including pumps of make Vickers/Rexroth-Bosch / Parker / Hydac /Hawe / IFM only shall be used.	

14.	Carriage and Saddle lubrication to be ensured as per original schematic and pressure switches, lubricating pipes and wipers are to be replaced.	
15.	Racks for the drive of Tailstock: Manufacture, supply and installation of racks of the machine tailstock– about 10 pieces of 500 mm length each and identical to those already fitted on the machine for extended travel of the tailstock by 5000 mm. Machined surface for mounting the additional racks already exists. Presently, Z-axis steel incremental scale of Fagor-make is fitted on this surface. This scale shall be removed to vacate the space required for installation of these racks.	
16.	Overhauling of Lubrication system for time-dependent lubrication of tailstock gears and guideways.	
17.	**System of digital display of thrust of tailstock quill against the job**: Vendor shall examine the possibility of providing digital display of tailstock thrust set hitherto by the operator manually. This system and its details shall be finalized during the technical scrutiny of the bid. Once finalized, vendors shall be asked to submit only the additional price impact of this item.	
	Note: Any modifications carried out on the machine shall not sacrifice original traverses, speed and feed ranges.	
18.	Painting: Machine outside body shall be painted with two coats of Apcolite (Asian paints) Premium enamel paint. Moving parts shall have light blue and fixed parts shall have dark blue colours. Interior of the machine is to be painted with two coats of red enamel paint. Wherever oil comes in contact with interior of the body, oil resistant paint is to be used. Letters/numerals etc. will have to painted with a different colour as required/as indicated by BHEL at the time of final painting. Painting shall be carried out according to the standard procedure for painting including cleaning and removing old paint, applying metal primer putty etc. Good finish shall be ensured. Overall machine aesthetic view shall be taken care of.	

B.	**ELECTRICAL AND ELECTRONICS:**	
19.	Disconnecting and removal of existing electrical system, spindle drive and motor, electrical cabinets, all the interconnected cables and complete wiring of the machine.	
20.(i)	Installation of new electrical cabinet(s) with IP54 protection with new AC spindle drive, PLC, electrical switchgear, control transformers, choke of suitable rating for drive and other accessories.	
(ii)	Spindle drive shall be of Siemens/ABB/Rexroth-Bosch/Fuji-make only. It shall have encoder feedback input from the drive motor and shall perform in torque control mode. Complete technical specifications and features of the offered spindle drive shall be submitted in the technical bid.	
(iii)	PLC shall be of Siemens/ABB-make only.	
(iv)	Cabinet(s) shall be stand-alone floor mounting type and shall be accommodated in the place and space vacated by existing electrical cabinet.	
21.	Installation and fitting of a new inverter-grade AC motor of Siemens/Baldor/Rexroth-Bosch/ABB-make for headstock with forced cooling and encoder feedback in place of the existing 55 kW, 300-1500 RPM (Base RPM: 300) Russian-make DC motor. Rated torque of the offered motor should match that of the existing DC motor.	
22.	New Inverter Grade High Efficiency (EFF1) AC motor, for Rapid travel of carriage and saddle movements replacing existing AC motor of rating 2.2 KW/ 3.7 KW, 4 POLE 1500 RPM, 100L/112M Flange Mount for each carriage. Preferably Siemens/ ABB As the existing motor fails and gets burnt frequently owing to the fact that rapid START/STOP is performed several times in quick succession for setting and checking purposes, it is proposed to install a suitable rating VFD (Siemens/ABB Make) for Rapid / Setting operation. A selector switch should be installed on the operator pendent for Rapid / Setting selection. In Rapid mode the motor should operate on 80-100% of max. Reference value and in	

	Setting Mode, the motor should operate on 20-30% of max. Reference value. The Reference value for "Rapid" & "Setting" should be user settable in the VFD through Parameters. All details of the VFD & AC Motor shall be submitted by the vendor.	
23.(i)	Installation of incremental linear magnetic scales for X-axes (transverse travel) of the front saddles of both the carriages.	
(ii)	Installation of incremental linear magnetic scale for Z-axis (longitudinal travel) of the carriages. Z-axis scale shall be common for both the carriages. It will, however, have two reader heads- one for each carriage.	
(iii)	New Incremental linear magnetic scale for Z-axis shall be installed just below the row of tailstock drive racks. Care shall be taken so that total thickness of scale, its housing, reader head and protective cover gets accommodated within the space between the bed casting and the tailstock drive gearbox.	
(iv)	Magnetic scales shall have adhesive protective tapes as well as protective covers.	
(v)	Fitting of suitable brackets to mount and align the above shall be in the vendor's scope of supply and work.	
(vi)	Each carriage shall have its own DRO, preferably of Electronica (India)/ Sony-make.	
24.	Stainless Steel Cable Drag Chains (Kabelschlepp-make) of suitable length & width, shall be laid along the length of the machine to transport the machine cables for each Saddle.	
25.	All HRC fuses and overload relays to be replaced with motor protection circuit breakers (MPCBs) of Siemens/ABB/GE/ Schneider-make.	
26.	All AC induction motors of the machine shall be restored with their cooling fans and fan covers wherever these are not there.	

27.(i)	Panel wiring is to be done as per industry standards. Engraved Labels shall be provided /pasted inside the cabinets/panels for identification of all the switchgear. These labels shall be in accordance with the new electrical schematic of the machine.	
(ii)	Printed ferrules shall be used for all PLC and switchgear wiring.	
(iii)	All used/unused PLC I/Os, field terminals of the auxiliary Motors, AC and DC supplies etc shall be terminated with proper identification on Terminal Blocks.	
(iv)	All Terminal blocks shall be screw type Phoenix-make.	
(v)	All outputs used through relay board.	
28.(i)	All wiring between electrical cabinets, operator panel, main spindle drive, motors, PLC, etc. shall be in the scope of supply and work of the vendor.	
(ii)	Vendor shall use only Lapp/Belden-make cables and conduits for all wiring.	
29.	Development of PLC logic and interface drawing shall be done by the vendor.	
30.	Interfacing and commissioning of Spindle, drive, PLC, Axes movements and all auxiliary motors.	
31.(i)	Operator Panels for both the carriages shall be equipped with all the existing operating and required features for effective utilization of the machine.	
(ii)	In place of the existing Russian/local made spider switches (joy stick) for operator control of feed and rapid movements of the carriage and saddle, Euchner-make Joy Stick with Push button in the centre of the operating lever (Model: WES1234DWZF) shall be provided for each carriage.	
C.	**COMMISSIONING, JOB PROVE-OUT AND ACCEPTANCE:**	
32.	Machine shall be functionally tested after completion of reconditioning and retrofitting work.	

33.	Geometrical tests shall be carried out and their conformance with OEM test charts shall be demonstrated by the vendor.	
34.	DROs of both the carriages shall be commissioned and their readings shall be calibrated with standard measurements such as screw gauge, measuring rods and measuring blocks as per shop practices. Accuracy within +/- 5 microns	
35.	**JOB PROVE-OUT**: A turbine rotor shall be fully machined on the reconditioned lathe. Successful machining of the rotor shall constitute as final acceptance and handing over of the machine.	

D.	**SPARE PARTS**	Qty (nos.)
1.	Euchner Joysticks WES1234DWZF	2
2.	Spindle drive similar to the one stated at Para B./2.	1
3.	Digital read out similar to B.5.(vi)	1
4.	Scale and reader head used for x-axis with cable	1 set
5.	Scale and reader head used for z-axis with cable	1 set
6.	Rapid motor for carriage similar to the one stated at B./4.	1
7.	Face plate jaws similar to the one stated at A./7.	4
8.	Telescopic covers of X-axis of carriage	1 set
9.	VFD for Rapid motor for carriage similar to the one stated at B./4.	1
10.	PLC card as used (one no. each type)	1 set
11.	Spindle encoder similar to used on machine	1

E. GENERAL CONDITIONS:

1. Vendor shall submit a compliance statement mentioning agreeing/not agreeing against each clause/para of the scope of supply and work. Wherever, there is a disagreement, vendor shall mention its own proposal in a separate schedule under the title "Deviations".

2. It is desirable that technical details against paras should be given by the vendor.

Annexure-1

Spindle/Headstock Bearings of Precision Heavy Duty Lathe m/c Model K 1614

S.No.	Type of Bearing	No as per GOST	Equivalent no.	Dimensions	Grade of Fit	Qty
1.	Double Row Roller* Bearing	A3182164	NN3064	320x480x121	A	1
2.	Double Row Roller* Bearing	A3182148	NN3048	240x350x92 **OR** 240x360x92	A	1
3.	Thrust Ball bearing	88164	51164	320x400x63	B	1
4.	Thrust Ball bearing*	88156/8156	51156	280x350x35 **OR** 280x350x53	B	1
5.	Radial Roller bearing	3532	22232	160x290x80	-	1
6.	Radial Roller bearing	3528	22228	140x250x68	C	1
7.	Radial Roller bearing	3624	22324	120x260x86	-	1
8.	Radial Roller bearing	3524	22224	120x215x58	-	2
9.	Radial Roller bearing	3622	22322	110x240x80	-	1
10.	Radial Ball Bearing	130	6030	150x225x35	-	2

* Exact measurements of the existing bearings shall be taken by the vendor after the machine is dismantled. Only after such measurements and subsequent concurrence of BHEL, shall the vendor initiate procurement process.