PR 89887144 - RETROFITTING & RECONDITIONING OF ECONO CNC LATHE M/C.		
ANNEXURE I		
PRE QUALIFICATION CRITERIA		
S.No	**Description**	**Vendor comments**
	Vendors who satisfy the following pre qualification criterion are only eligible to participate.	
1	The vendor shall have experience of having successfully carried out CNC retrofitting & reconditioning work in India. **Experience of having successfully completed similar works during last 7 years (ending last day of** month previous to the one in which applications are invited) should be either of the following: - a. Three similar completed works, each costing not less than the amount INR 8.24 lakhs. or b. Two similar completed works, each costing not less than the amount INR 10.3 lakhs. or c. One similar completed work costing not less than the amount INR 16.5 lakhs. "Similar work" here means CNC retrofitting / reconditioning of machine tools. Documentary evidences like PO copy, Final MOM or Completion Report to be submitted in support of the above.	
2	The vendor should submit at least one **Performance Certificate** issued by customer regarding satisfactory performance of the retrofitted CNC machine within the last 7 years. (Hardcopy of the certificate or through Email directly from the customer). Copies of purchase orders/work orders should also be submitted for verification.	

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ANNEXURE II		
MACHINE SPECIFICATION & DETAILS OF EXISTING MACHINE PARTS		
S.No	**Description**	**Vendor's Remarks / Compliance**
1	**Machine specification:** **Supplier.....: HMT/KALAMASSERY** **Comm.date.....: 2-Feb-95** **Type.....: ECONO 26/2000** **Height of center.....: 350mm** **Swing over bed.....: 545mm** **Distance bet.centers.....: 2000mm** **Speed range:Forward.....: 40-2000rpm** **Reverse .....: 60-2375rpm** **Crossslide travel/x-axis.....: 240mm** **Saddl long.travel/z-axis.....: 1850mm** **Rapid traverse x&z axes.....: 5000 mm/min** **Rating.....: 18 kw** **Floor space.....: 4.5 x 2.0m**	
2	**CNC SYSTEM:** HINUMERIK 2000 CNC controlling 2 axes and 1 spindle	
3	**X-axis**	
3.1	Motor: 1FT5 064-0AC01-2 Rated speed: 2000RPM, Rated torque (100 K): 4.7Nm Standstill torque (100 K): 5.5Nm, Rated current: 3.1A	
3.2	Drive: SIMODRIVE 610 6SC 6101-A-Z	
3.3	External Encoder: BALLUFF ENCODER 2500 PPR	
4	**Z-axis**	
4.1	Motor: 1FT5 064-0AC01-2 Rated speed: 2000RPM, Rated torque (100 K): 4.7Nm Standstill torque (100 K): 5.5Nm, Rated current: 3.1A	
4.2	Drive: SIMODRIVE 610 6SC 6101-A-Z	
4.3	External Encoder: BALLUFF ENCODER 2500 PPR	
5	**Spindle motor** : 3 phase squirrel cage Induction Motor rated 11 kW, 1455 RPM, 22A	
5.1	**External encoder for spindle :** SPINDLE ENCODER : 1024 PPR	
6	Machine in-built with turret	
7	Isolation Transformer & Stabilizer of 50kVA rating.	
SCOPE OF SUPPLY		
S.No	**Description**	**Vendor's Remarks / Compliance**
1	**Electrical & Electronics parts/accessories**	

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1.1	Supply of CNC Controller, able to perform all the machine functions. CNC PACKAGE: Latest version of CNC system with min 10.4" Colour display package only. CNC Makes acceptable: SIEMENS/FANUC/FAGOR The CNC system offered shall have the following features. 1. Full Alphanumeric Keyboard and Colour Display (TFT/LCD monitor) of size 10.4" or more. 2. MCP and other Operator controls having necessary Push Buttons with Indicating Lamps and Selector / Toggle Switches. 3. PLC configuration having at least 96 Inputs and 64 Outputs with necessary I/O cards. 4. Graphic Machining Simulation of tool paths in part programs. 5. Minimum 3MB user memory along with flash card facility for program storage. 6. Manual measurement and automatic storage of tool offsets in tool offset memory. 7. All turning operations and to cater all existing machine features. 8. CNC data can be transferred quickly and easily using USB / Compact Flash (CF) card / Ethernet interfaces Note: 1. The CNC system being offered shall be currently under production and spares/service support shall be available for the next 15 years. 2. All features available in the old CNC system of the machine shall be made available in the new CNC being offered. 3. Service support shall be available in India. Details of the service centre facility available in India to be provided.	
1.2	Supply of AC servo motors of suitable capacity for X & Z axis with Built-in Encoder for both axes. Torque and other ratings shall be equal to or higher than the parameters of the existing servo motors. Any mechanical interfacing arrangement required to match the new motor with the existing mechanical drive system should be included in the offer. The type number / model of the motor selected should be indicated in the offer.	
1.3	Supply of 2500 PPR external encoders for X and Z axes.	
1.4	Supply of AC digital servo amplifier modules for X and Z axes. The rating of the drive modules selected should support the selected servo motors. The type number / model of the drive module selected should be indicated in the offer.	
1.5	Supply of new AC spindle induction motor of suitable capacity to replace the old spindle induction motor. The parameters of the offered motor to match with the existing motor and suitable to be interfaced with the CNC system offered. The type number / model of the motor selected should be indicated in the offer and the technical leaflet should be enclosed.	
1.6	Supply of 1024 PPR external encoder for the spindle.	
1.7	Supply of necessary line filter and reactor units for the drive modules	
1.8	Supply of motor power cable, signal cables of sufficient length with end connectors for axes and spindle.	
1.9	Supply of necessary 24V SMPS units of Siemens/ Fanuc or any other reputed make.	
1.10	Supply of necessary plate for mounting the new CNC operator panel in the machine.	

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1.11	Supply of new Electrical panel for mounting the drives, power supply units and other switchgears. The panel should have the following features. 1. The panel shall be metal enclosed, indoor, floor mounting and free-standing type. The panel shall be free from flaws, dents and undulations. 2. All mating surfaces shall be provided with neoprene gaskets. Panel shall be provided with three point locking arrangement. Hardware used shall be chrome/ nickel - plated. The anti-vibration pad shall be of hard rubber. 3. Panel shall be coated with two coat of anti- rust paint (primer) and two coat of acid alkali resisting epoxy based paint suitable for working in saline and corrosive atmosphere. 4. Removable cable entry shall be provided. 5. The bottom surface of the control panel should be free and no components should be mounted on it.	
1.12	Supply of air conditioning unit for the Electrical panel and operating panel of sufficient rating. Air conditioner shall be of following makes only. i. Advanced cooling System pvt ltd ii. Werner Finley pvt ltd iii. Emmppe Associates iv. Sunbeam v. Rittal	
1.13	Supply of suitable Hand held unit along with 5 mtr cable and adapter as required.	
1.14	Supply of suitable ratings of MCB, MPCB, contactors, relays, fuses and other control elements for all the auxiliary motors / equipments in the machine.	
1.15	Supply of new limit switches, proximity switches, flow switches etc for the replacement of all old sensors in the machine (for axes & other functions).	
1.16	Supply of voltage stabilizer and isolation transformer of rating 50 KVA. Makes: NEEL, AEI, POWER AID, DELTA, Servo max (or any other make acceptable to BHEL)	
1.17	Supply of necessary cables, wires, glands, sleeves, ferrules etc for complete rewiring of the machine	
1.18	Supply of new induction motors for replacing all the old motors in the machine.	
1.19	Supply of tools for maintenance of the machine. 1. Digital multi meter (AC/DC 0-600V) - 1 no 2. Clamp meter (AC/DC 0-100A) - 1 no 3. Hand driven analog insulation tester (Insulation Resistance: 0–2000 M ohm, Nominal Test Voltages d.c.: 250 V 500 V 1000 V) - 1 no 4. Electrician tool set 14 piece - 1 set 5. Portable hand drilling machine - 1 no 6. Hole saw cutter ½", 3/4", 1", 1-1/4", 1-1/2" - 1 set 7. Mason drilling machine (wall drilling machine) - 1 no 8. Portable jig saw cutter - 1 No	
1.20	Any material not specified in scope of supply but required for successful commissioning in the scope of the contractor.	
2	**Mechanical parts/accessories**	
2.1	Supply of suitable brackets for mounting the new AC servo motors for axes/spindle.	
2.2	Supply of Hydraulic oil chiller unit of Capacity: 5000 kcal/hr for the machine. Chiller of following makes only acceptable to BHEL i. M/s Advanced cooling System pvt ltd ii. M/s Werner Finley pvt ltd iii. Emmppe Associates, Coimbatore iv. Sunbeam v. Rittal	

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2.3	Supply and installation of Centralized lubrication system (including pump, motor and piston distributors(for all axes)) for the guide ways. Model No: ALU 05 Make: Vogel/SKF/Cenlub makes only acceptable to BHEL.	
2.4	Head stock lubrication circulation bi-directional gear pump of flow 12.5 LPM to replace the existing system. The offered model shall be of reputed make acceptable to BHEL. Existing Make: St. Joseph Research Corner, Bangalore.	
2.5	Ballscrew rod with C3 accuracy for X axis. Dia 25x5P, length: 662 mm	
2.6	V belt and Timing belts - ONE SET	
2.7	High Pressure hydraulic hoses and coolant hoses with suitable fittings - ONE SET	
2.8	Machine door guideway rollers and bearings - ONE SET	
2.9	Face couplings (curvic) for turret housings. Drawing to be prepared by vendor and supplied.	
2.10	Lubrication copper coated lines - ONE SET	
2.11	Machine Guideway Wipers for all axes - 5 SET	
2.12	Ballscrew end support bearings for X axis -ONE SET	
2.13	Hydrulic Piston pump and pressure reducing valve as given below Pump model: V8A1RH-20 Pr. Reducing valve with check (free retun line flow) Model: MG-02B-03 Make: Daikin or Equivalent in any other make	
2.14	Pilot operated DC valve: CJ 5/2-1/4 -Qty: 3 Nos. Make: Festo or equivalent in other make.	

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ANNEXURE III		
SCOPE OF WORK		
S.No	**Description**	**Vendor's Remarks / Compliance**
1	Preparation of new circuit diagram for complete electrical systems with the new CNC/ Drives/ Motor. Design of brackets for motor for X/Z and spindle wherever required.	
2	Dismantling and removal of old Electrical cabinets, CNC control panel, operator panel switch gear ,CNC,PLC, feed motors, spindle motor, Drives , linear scales, encoders and field devices along with old cabling and wirings.	
3	Installation of X axis ball screw rod and end bearings.	
4	Assembly of servo motors for X, Z and spindle with suitable mounting brackets.	
5	Installation of new guideway wipers for axes.	
6	Assembly of Face couplings (curvic) for turret housing after dismantling the turret assembly suitably.	
7	Installation of new Electrical Panel and Interfacing the machine control elements like limit switches, pressure switches, level switches, pushbuttons etc, with necessary wiring materials.	
8	Erection of the operating pendent and mounting the CNC system on it.	
9	Assembly of AC Drives and other switchgears in the new Electrical Panel.	
10	Mounting of external encoders wherever required.	
11	Replacing the limit switches, proximity switches and other sensors in the machine.	
12	Complete rewiring of the machine to establish all the existing machine functions.	
13	Installation of all other supplied materials.	
14	Interfacing the CNC system, drives, motors, lubrication system and other accessories to establish the complete functioning of the machine.	
15	Optimizing the parameters for X, Z and spindle	
16	Development of PLC program as per the new CNC controller and implementation on machine.	
17	Laser calibration of X & Z axes (before and after the work) and generation of compensation data for pitch error and backlash.	
18	Prove-out of all the functions of the machine. Demonstration of all programming features of new CNC System .	
19	The complete system will be integrated and proved out for performance With a standard test piece and also two regular production components.	
20	**BACK UP:** The back up of machine, softcopy of documentations to be given in CD, USB as well as in flash card compatible with the CNC system.	
21	**TRAINING:**	
21.1	Training shall be given for 2 Maintenance personels on CNC/ Drives maintenance & for 2 Production personels on Operation and Programming of the CNC at the OEM's works for 5 days.	
21.2	Training to be imparted to BHEL personels on operation, programming and maintenance of the CNC machine at BHEL for 2 days.	
22	**DOCUMENTATION:** 3 sets of the following documents shall be supplied Electrical circuit diagram PLC printout in ladder form with symbols & comments in English O&M manuals (hard copy) for CNC, PLC, Drives & Measuring systems. Programming manual (hard copy) for CNC system Machine data (NC, PLC, Setting & Alarm texts), Drives data & PLC program Details of all mechanical modifications & fittings with drawings.	

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23	**WARRANTY:** The vendor shall stand warranty for the material supplied and work done for a period 12 months from the date of acceptance of the machine after successful job trials and completion of all work as per scope. Any material (supplied by the party) found defective within warranty period shall be replaced free of cost by the party.		
24	**GENERAL CONDITIONS:**		
24.1	The equipments should be suitable for 415V, 3ph, 50Hz, a.c. supply		
24.2	Parties are advised in their own interest to visit BHEL, Trichy on any working day to inspect and study the machine before submitting their offer.		
24.3	Any other work (electrical, mechanical and electronics) not mentioned in this scope of work to keep the machine in working condition with all features are in the scope of the contractor.		
24.4	Materials used shall be of reputed make or as per IS standards.		
24.5	Party shall bring all tools and testing equipment with them during erection and commissioning.		

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