

<u>RECONDITIONING OF BERTHIEZ HORIZONTAL MACHINING CENTRE (5/A/2064)</u>	
SNO	DESCRIPTION FOR BHEL REQUIREMENT
A	MACHINE DESCRIPTION
A.1	Make: BERTHIEZ, FRANCE
A.2	Type: Horizontal Machining Centre, MODEL : C.U.AFA 130T
A.3	X-axis traverse (Table Travel) : 2000mm
A.4	Y-axis Traverse (Head Stock Travel): 1500mm
A.5	Z-axis Traverse (Coloumn Travel) : 1250 mm
A.6	W-axis Traverse (Spindle Travel) : 800 mm
A.7	B-axis (Rotary Table) : 1250 x 1250 mm
A.8	Spindle Diameter of RAM : 130mm
A.9	Spindle speed infinitely variable with 3 gear ranges : Low Range 15 to 100 rpm at constant torque, Medium Range 100 to 450 rpm at constant torque, High Range 500 to 1500 rpm
A.10	Spindle nose details: ISO 50
A.11	Tool clamping system: Clamping by disc springs, decamping by hydraulic cylinder
A.12	Overall dimension of the machine: Length of the floor area : 9000 mm, Width of the floor area : 8500 mm, Height of the machine : 4500 mm
A.13	BACKGROUND OF MACHINE
A.14	The Berthiez HMC is custom built to machine the magnet frames of Traction Motors. The machine has a casting for base-cum-bed on which Linear bearings are provided on all axes. For smooth movement of the column, Linear bearings are fixed to the steel base and grouting has been done for the steel base. The steel base is having leveling screws. Bed is leveled on leveling screws.Column is rested on the Linear bearings through bracket.Moving column traverse is through balls screw and nut driven by A.C. servo motor. Ball screw is fixed to the bed at either end through INA cylindrical Thrust roller bearings. Over the column, head stock assembly is mounted and this unit traverse is through “Y axis”, ball screw and nut and it is held by keeper plates. For smooth traverse in “Y” axis, linear bearings are mounted on guide way for the column hardened guide ways are fixed and ground in assembled condition.

SNO	DESCRIPTION FOR BHEL REQUIREMENT
A.15	Head assembly traverse is through “Z” axis balls screw and nut.Spindle assembly consists of tool clamping assembly also.For tool clamping, Disc springs are used. Tool holder is located in ISO 50 taper and clamped against preloaded disc springs of about 40 Kg/cm2 . For declamping of tool holder, disc springs will be compressed hydraulically and tool holder will be pushed out of the ISO 50 taper.Spindle drive is through gear train by A.C. servo motor of 37 KW capacity. Spindle is having 3 ranges of speed namely low range (15 to 100 rpm) medium range (100 to 450 rpm) & high range (500 to 1500 rpm),Headstock is placed on Y axis through Linear bearings and held by keeper plates.
A.16	The machine bed has 1 table rotary (B axis) & Two nos. of pallets for job transfer. The machine is equipped with hydraulic power pack for following functions:- 1. Clamping of X axis (saddle), Y axis (Head slide) and Z axis (column) 2. Gear shifting in Headstock for spindle speed 3. Tool holder ejecting from spindle 4. Table clamp 5. Pallet clamp
A.17	Machine has been equipped with Siemens Sinumerik 840D Powerline CNC Control system, S7-300 PLC, 611D Servo Drives & Motors.
B	REQUIREMENTS:
B.1	Machine should be completely reconditioned .
B.2	Geometrical accuracies of the machine are to be restored so that the errors are within the admissible values mentioned in Para E.2
B.3	The machine should be capable of machining contours with machine positioning accuracies as per VDI/DGQ 3441/ ISO 230-2.
B.4	The retrofitted machine should be capable of machining contours with positioning accuracies as mentioned in Clause E
C	SCOPE OF SUPPLY:
C.1	Cable ducts, conduits and cable drag chains of reputed make should provided as per requirement for routing of cables.
C.2	Backlash free re-circulating ground ball screw with Pre-loaded double nut accuracy Class C3 or better, for X, Y, Z & W Axes . The make of ball screw should be as per makes specified at Clause J.11
C.3	Bioplast/Turcite coating should be provided for all the slides of the machine.
C.4	Wipers should be provided for the guide-ways of all axes of the machine.
C.5	Lubrication system should be provided for X, Y, Z & W Axes.
C.6	All the hydraulic/lubrication/coolant/pneumatic pipes, hoses & valves are to be replaced with new ones.

SNO	DESCRIPTION FOR BHEL REQUIREMENT
C.7	Chip conveyor has to be replaced with new design of same capacity, with inbuilt coolant tank so that it can be fitted at ground level.
C.8	All Linear bearings, Spindle Bearings & Other bearings are to be replaced with new ones.
C.9	Table bearing (FULL COMPLEMENT NEEDLE BEARING RAN2240) to be replaced, with new bearing. The Spindle is having Bearing No: NNU 4936 K , NNU 4934 K.
C.10	Worm shafts and related gears of table, as well as motor mounting arrangements to be replaced with new items.
C.11	All Clamping piston-cylinders of table along with table motor coupling to be replaced, with new.
C.12	Table lubrication pump-motor to be replaced, with new.
C.13	All the sump and coolant pumps are to be replaced with new one
C.14	Telescopic antirust metallic covers of X,Y & Z axes to be replaced with new ones. The makes to be specified in the technical bid
C.15	The headstock gear box has to be reconditioned with replacement of all gears & shafts, hydraulic piston cylinder. Bearing seating of headstock are damaged & are to be repaired.
C.16	Lubrication pump of headstock gear box along with pipes, hoses, solenoid valves, pressure switches are to be replaced
C.17	The Power packs of the machine (02 nos) are to be replaced with new one, along with replacement of all solenoid valves, pressure switches, & related hydraulic parts.
C.18	Oil Chiller unit for cooling the Hydraulic oil .
C.19	All the limit switches, timing belts, gauges are to be replaced.
C.20	All the Mechanical & Electrical items required for reconditioning of the machine shall be provided by the vendor
C.21	All Electrical field wiring are to be replaced with new ones as per IEC standards.
C.22	Suitable linear measuring scale & Transducer system 1VPP of makes as specified at Clause no. J.8 should be provided for X, Y, Z & W Axes and Rotary encoder 1Vpp of 36000 PPR for Rotary Table B axis. The feedback interface cable for all 5 axes approximately 30 meters (From machine to Servo drive at Electrical control Panel) should be provided. The linear scales must have accuracies no lesser than 5 Micron per meter and should be suitable for resolutions of 1 Micron (0.001mm) for matching the 840D CNC system.
C.23	DOCUMENTATION :- consisting of
C.24	O&M manual for all mechanical Brought out Items – 3 sets.
C.25	Details of all mechanical modifications & fittings with drawings – 3 sets.
C.26	Mechanical drawings of parts which are replaced/modified – 3 sets.
C.27	Spare part list containing mechanical, hydraulic, pneumatic and electrical parts – 3 sets.

SNO	DESCRIPTION FOR BHEL REQUIREMENT
D	SCOPE OF WORK:
D.1	Mechanical reconditioning: The machine should be completely reconditioned & modified to the suit the fitment of CNC system on the machine and thereafter achieve positioning accuracies & repeatability as mentioned in Clause E. Emphasis is to be given on the following works while doing the reconditioning:
D.2	The mechanical accuracies of the slides are to be restored by scrapping of guideways of X, Y, Z axis, along with Keeper plates & taper wedges.
D.3	Biplast/Turcite coating is to be used extensively on the machine slides wherever necessary.
D.4	Installation of Backlash free ball-screw & ball-nut system for X, Y, Z & W Axes.
D.5	Electrical wirings of the machine as per requirement.
D.6	Installation of the linear scales for X, Y, Z & W axes.
D.7	Installation of lubrication systems of adequate capacity.
D.8	Adjustments/Levelling of all axes to achieve the desired accuracies as per OEM specifications.
D.9	Reconditioning of table (B Axis). Worm shafts and related gears of table along with table motor coupling are to be replaced with new ones.
D.10	The level and run-out of the table should be checked and rectification (if any) should be carried out accordingly.
D.11	Automatic Pallet Changer(APC), to be retained & has to be reconditioned.
D.12	Automatic Tool Changer(ATC), to be removed, from the machine.
D.13	Refurbishment/Replacement of hydraulic counterbalance with replacement of oil seals, if required.
D.14	The old paint is to be scrapped & the machine should be painted with RAL 6011 Reseda green colour, after applying of Knifling Paste filler or equivalent material.
D.15	Relevant Jobs will be machined for proving out the accuracy of the machine with all operations at BHEL, Bhopal.
E	ACCURACY:
E.1	Machine should be able to meet the positioning accuracies & repeatability measured as per VDI/ DGQ3441/ ISO 230-2 (Latest Revision) using Laser interferometer.
E.2	Geometrical accuracy should be as per IS 15250 (Part 1): 2002, ISO 10791-1:1998
E.3	NOTE: All these tests should performed by the vendor at BHEL Bhopal. Vendor should arrange for personnel from CMTI, Bangalore for carrying out the LASER accuracy test on the machine. The entire cost of deputation of CMTI personnel would be borne by the vendor.

SNO	DESCRIPTION FOR BHEL REQUIREMENT
F	COMPLETION:
F.1	Upon completion of the scope of supply and scope of work, successful machining of BHEL components shall constitute the FINAL HAND-OVER of the machine and completion of the job.
G	PERIOD OF RECONDITIONING:
G.1	24 weeks from the date of Release of the machine. Upon receipt of the Work Order, the party must plan out the procurement of materials, transportation and execution of the work with a detailed project schedule. The date of release of the machine will be decided on mutual consent of BHEL and the party.
H	TRAINING:
	The vendor should provide
H.1	One week training for 2 persons on mechanical maintenance/aspects at IMTMA, Bangalore during/after execution of the work.
I	GUARANTEE:
I.1	Vendor shall stand guarantee for smooth functioning of the machine, including all the items and parts used in retrofitting, for a period of one year from the date of FINAL HAND-OVER of the machine.
J	MAKES OF MATERIALS
	The following are the makes of the material for the scope of supply:
	1. Bearings: SKF/FAG/RHP/TIMKEN/NTN/NSK/NADELLA/INA 2. Cables & Wires: LAPP/Finolex/Helukabel/IGUS/Kabelschlepp 3. Conduits: LAPP/ Farnell/Helukabel. 4. Motors: Siemens/BCH/ABB/GE-Marathon/Bharat Bijlee /Kirloskar /Crompton/SEW 5. Pumps: Rexorth/Yuken/Vickers/Polyhydron/HAWE/Hydac 6. Ball screws: THK/SKF/Korta/NSK/HMT/Rexorth/Hiwin 7. Electrical items & controls: As per IEC standards 8. Linear Scale & measuring system: Heidenhein/Fanuc/Siemens/Reinishaw/Fagor

SNO	DESCRIPTION FOR BHEL REQUIREMENT
K	PRE QUALIFYING CRITERIA:
K.1	All the parties should have experience of either Manufacturing of machine Tools or Reconditioning of machine Tools as mentioned in K.2 or K.3
K.2	Manufacturing of CNC Horizonatal Machining Centre of spindle diameter 100 mm or more OR Manufacturing of CNC Vertical Machining Center machines of Chuck diameter 5 feet/1500 mm or more
K.3	Reconditioning of CNC Horizontal Machining Center machines of spindle diameter 100 mm or more OR Reconditioning of CNC Vertical Machining Center machines of Chuck diameter 5 feet/1500 mm or more
K.4	The party must submit copy/copies of A. Purchase/Work Order for award of work B. Performance Certificate of the machine from the end user which has to be issued within 1 year from the date of openinig of this tender enquiry
K.5	Financial Qualifying Requirement for Non-MSME Vendors :
K.6	The average Annual Financial Turnover during last 3 years ending 31.03.2019 should be at least 41.55 Lakhs . Audited Profit & Loss account and Balance Sheet should be submitted as proof of Average Annual Turnover.
K.7	The vendor should have experience of successfully executed Purchase Order / Work Order for similar works (As mentioned in Clauses K.2 & K.3) in any of the following ways : (a) One similar completed work of order value not less than Rs. 110.81 Lakhs OR (b) Two similar completed works of order value not less than Rs. 69.26 Lakhs each OR (c) Three similar completed works of order value not less than Rs. 55.40 Lakhs each. Copy of Purchase Order/Work Order along with Completion Certificate /Performance Certificate from end user to be submitted in Technical bid. Note: Similar work is defined in Clause K.2 / K.3
K.8	No Financial Qualifying Requirement for MSME Vendors. Note: This is to comply the relaxation as per the prevailing guidelines issued by Government Of India

SNO	DESCRIPTION FOR BHEL REQUIREMENT
L	NOTES:
1	Parties are strongly recommended to examine the machine, its documents before submitting their offer.
2	In case the machine tool or any part thereof is required to be shifted outside the premises of BHEL, Bhopal for execution of the reconditioning work, Comprehensive Insurance together with Bank Guarantee should be provided by the bidder, based on the salvaged value of the items (to be indicated by BHEL). If required, BHEL team will inspect the machine prior to dispatch of the same back to BHEL Bhopal.
3	The standard payment terms of BHEL Bhopal are as under: -
3.1	30% of the contract value shall be paid after joint inspection by BHEL and contractor. This payment would be released on receipt of Bank Guarantee of like amount which should be valid till the completion of reconditioning work.
3.2	60% of the contract value shall be paid after the completion of the reconditioning and final HAND-OVER of the machine for production.
3.3	10% of the contract value to be paid after release of Performance Certificate by production and maintenance personnel of BHEL. This payment shall be released against the BG of like amount. The BG should be valid till the expiry of the warranty period.
3.4	Normally payment will be made within 60 days from the date of submission of Bill and 45 days in case of MSME vendors. TDS will be deducted as per the provisions of Income Tax Act and GST Act
4.0	LD clause shall be applicable as 0.50% (Half Percent) per week or part thereof, of the Contract Value. The LD shall be deducted if the final hand-over of the machine is delayed beyond the agreed period for reconditioning. The maximum amount of the LD shall be 10% (Ten Percent) of the Contract Value.
5	The machine will be given to the supplier in fully running condition and it will be the responsibility of the supplier to restore the machine back to full functionality after the reconditioning work.