

**BHARAT HEAVY ELECTRICAL LIMITED, JHANSI**

Spec. No.	7604
Item NO.	SP/TEST/3/2/7604
Location	New Bogie Shop
Qty.	01 No.

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF 3D CNC - COORDINATE MEASURING MACHINE (CMM)**NOTE:-**

1. Vendor must submit complete information against **clause no. 22**. The offer meeting this clause would only be processed.
2. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
3. The offer and all documents enclosed with offer should be in English language only.

SCOPE: SUPPLY, ERECTION & COMMISSIONING OF COMPUTER NUMERICALLY CONTROLLED, FIX BED TYPE 3D CO-ORDINATE MEASURING MACHINE ALONG WITH ALL REQUIRED FIXTURES COMPLYING WITH SPECIFICATIONS AS BELOW

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	BIDDER OFFER	DEVIATION	REMARKS
1.0	PURPOSE				
	A open bridge design CNC 3D CMM with Multi Application Sensor System (MASS) & stationary machine table is required for complete automatic inspection of precision components Viz: Suspension tubes of 6000 HP three phase loco, Vande Bharat Bogie frame sub assemblies like traction centre, control arm, brake discs, gear case etc. (Drg. attached). It should be able to perform inspection of all parameters of a component from start to finish without the operator's intervention in between. The machine should also be capable to measure components in manual mode.	Vendor to Specify & Confirm			
2.0	SPECIFICATION:				
	The offer should cover supply, erection and commissioning of a computer numerically controlled, Bridge type 3D Coordinate Measuring Machine, complete in all respects, ready for use. Result output facility in different format like text, pdf, HTML, excel, word etc. Measuring range and accuracy required from the machine is detailed out in subsequent clauses.	Vendor to Confirm			

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2.1	TECHNICAL REQUIREMENTS				
2.1.1	Measuring Range: Machine measuring range should be suitable to BHEL requirements.	Vendor to Confirm			
	X= 1200 mm minimum or more				
	Y= 1500 mm minimum or more				
	Z=1000 mm minimum or more				
2.1.2	Job Weight: 1000 Kg or more	Vendor to Specify & Confirm			
2.1.3	Standard Clamping and holding facility on CMM table to be provided. (Minimum 04 nos of magnetic V-Blocks)	Vendor to Specify & Confirm			
2.1.4	Resolution for X,Y,Z axis : 0.2 micron or better	Vendor to Confirm			
2.1.5	Measuring Uncertainty independent of the position of the spindle as per ISO 10360-2	Vendor to specify and Confirm			
	Length Measuring Error, According to ISO 10360-2				
	MPE_E : 3.5 + L/ 250 microns or better				
2.1.6	Probing Error, According to ISO10360-2	Vendor to specify and Confirm			
	MPE_P : 3.5 micron or better				
2.1.7	Form measurement error (Roundness) RONt(MZCI)=3.5 microns or better as per ISO 10360				
2.1.8	Scanning Probing Error with time	Vendor to Confirm			
	MPE_{THP} : 4.5 micron or better				
	Time T = 59 Sec. or better				
	ACCURACY: (proving of above measuring accuracies as per ISO 10360-2 standard for CMM)	Vendor to specify and Confirm			
	1) Length of the probe to measure the above measuring uncertainties to be specified. Also vendor to specify in detail How the accuracies will be checked. 2) All the accuracies to be proved as per the standard ISO 10360 at site and at manufacturers end. 3) The above mentioned accuracies should be checked with supplied probe heads. 4) The gauges used for proving of accuracies should be traceable to national/international standard.	Vendor to Specify & Confirm			
2.1.9	TEMPERATURE REQUIREMENT:				
	a) Accuracy should be guaranteed in the following operating temperature gradients:	Vendor to Confirm			
	b) Temperature range for MPE _E : 18°C to 22 °C				
	c) Variation per day : 2.0 deg K per day				
	d) Variation per meter : 1.0 deg K per meter				
	e) Humidity : 40 to 80% non condensing				

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2.1.10	Machine Control : Provision of joy stick for three axis operation with manual control / wireless joystick control system for control of m/c. Measurement facility with manual and CNC(auto) mode.	Vendor to Confirm			
2.1.11	Computer system /Operating System : Latest windows based OS menu driven with user friendly with latest version with updates .- Minimum with Windows 10, 64 Bit.	Vendor to Confirm			
2.2	(3D- CMM) Machine capabilities:				
2.2.1	The machine should be capable of complete automatic inspection of components	Vendor to Confirm			
2.2.2	It should be possible to carry out the inspection without physical alignment of the work piece.	Vendor to Confirm			
2.2.3	The system should be capable of measurement in point to point probing mode as well as in continious scanning mode with the same probe head.	Vendor to Confirm			
2.2.4	The machine should be capable of processing the measuring of all geometric parameters including nominal/ Actual comparison and evaluation of all form and position errors in accordance with ISO 1101.	Vendor to Confirm			
2.2.5	For each individual job the machine should produce a customised print out detailing all actual dimensions as inspected.Dimensions deviating from the laid out tolerances are to be indicated specifically in RED, with magnitude of deviations, including tolerance band utilization.	Vendor to Confirm			
2.2.6	The software to have facility for producing combined customised reports for measurement taken by CMM .	Vendor to Confirm			
2.3.0	Main Features:				
2.3.1	The machine should have rigid traveling bridge, stationary table type of construction.X and Y guideways should be covered with bellows to protect the surface and scales/ drive mechanism from contamination. Machine should have air bearing in all the axis.Y axis guideway should be directly integrated in the worktable for higher stability	Vendor to Confirm			
2.3.2	Motorised movement in all axes by joystick and CNC programmed measuring traverse for automatic measurment.	Vendor to Confirm			

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2.3.3	Drive system movement should be motorised, all moving parts should slide on wear-proof guide with linear motion guide bearings and long accuracy life. Variable Speed control in CNC mode.	Vendor to Confirm			
2.3.4	The machine should be of rigid/sturdy construction.	Vendor to Confirm			
2.3.5	Temperature Correction:- Suitable active Temperature sensors to be provided for machine and part for applying temperature correction.	Vendor to Confirm			
2.3.6	The machine guideways should be well protected with dustcover/bellows/gaurds	Vendor to Confirm			
2.4.0	<u>Operating Pannel:</u>				
2.4.1	Portable operating panel with joysticks and function key should be provided for motorised and manual movement in all axes and full CNC programmed measuring traverse for automatic measurement. The operating panel should have all the function for operation of machine.	Vendor to Confirm			
2.4.2	Feature for speed control during the CNC and joystick mode should be provided .	Vendor to Confirm			
2.5.0	<u>Measuring System:</u>				
2.5.1	High precision metallic scales, with virtually zero expansion coefficient for eliminating temperature influences.	Vendor to Confirm			
2.5.2	Provision of scales vendor to fix as per supplier norms / scale should be rigidly fixed to the guideways for minimizing the influence of deformation due to temperature gradient.	Vendor to Confirm			
2.6.0	<u>Probe head and its assessories</u>				
2.6.0	Latest Reneshaw make or equivalent probe head with suitable extensions to be offered. Compatibility and applicability of these probe set up will be checked by BHEL at supplier works as well as post delivery at BHEL works.	Vendor to Specify & Confirm			
2.6.1	Digital Scanning Probe head should have point to point and scanning facility (must) for measurements of deep bores, leading edge and small sharpe contours. Note: Provision of Probe head by vendors must meet the measurement requirement of BHEL components with known/unknown profiles, during measurements of jobs the long extensions with stylus provided on probe head must be balanced,it should not be unbalanced.	Vendor to Specify			
2.6.2	Probe Head Should be able to carry probe tips up to 500gm or more / 800 mm extensions.	Vendor to Specify			

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2.6.3	The Probe head sensor should have weight balance mechanism for compensating the effect of different weights of probe configurations.	Vendor to specify			
2.6.4	Probe head mechanism should have excellent thermal stability and reliability.	Vendor to Confirm			
2.6.5	Machine should have minimum probe deflection range ± 1.00 mm. Probe head must have manual / automatic probe change facility enabling the operator to use different probe configurations.	Vendor to Specify			
2.6.6	Smallest styli tip dia that can be connected to probe head is 0.3 mm.	Vendor to Confirm			
2.6.7	Stylus carrying ability on length 500 mm or above.	Vendor to Confirm			
2.6.8	Safety Collision protection facility should be provided.	Vendor to Confirm			
2.6.9	Following styli kit shall be provided Dia 0.5 mm length of 28 mm or equivalent- 01 Nos. Dia 1.00 mm length of 28 mm or equivalent – 01 Nos. Dia 1.5 mm length of 28 mm or equivalent – 01 Nos. Dia 2 mm length of 30 mm or equivalent – 1 Nos. Dia 3 mm length of 30 mm or equivalent – 01 Nos. Dia 3 mm length of 50 mm or equivalent – 01 Nos. Dia 4 mm length of 50mm or equivalent – 01 Nos. Dia 5 mm length of 50 mm or equivalent– 01 Nos. Dia 8 mm length of 75 mm or equivalent – 01 Nos. Extension rods dia10mm length 50 mm or equivalent– 02Nos. Extension rods Dia 10mm length 100 mm or equivalent – 02 Nos. Extension rods Dia 10mm length 200 mm or equivalent– 02 Nos. Stylus Clamping Adapter – 04 Nos. knuckle Joint Dia 10mm or equivalent– 04 No's Standard Cube for star adapter - 4 Nos	Vendor to Specify			
2.6.10	Probe kit with various extensions upto length 500 mm should be made available	Vendor to Specify			
2.6.11	Machine must be supplied with automatic stylus change facility enabling the operator to use minimum 6 different styli combination before recalibration.	Vendor to Confirm			

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2.7.0	Probe calibration artifact				
2.7.1	Software must allow to store 999 probe configuration calibration data.	Vendor to Specify			
2.7.2	Suitable Reference sphere should be provided along with Stand with NABL Calibration certificate for covering all type & sizes of probe tips.	Vendor to Confirm			
2.8.0	Application software				
2.8.1	CMM manufacturer/Supplier should have application software with valid perpetual licence from internationally known certifications body like PTB/NIST or equivalent etc.	Vendor to Confirm			
2.8.2	Universal geometric measuring program for both manual and CNC operation, including component misalignment compensation in plane and space form and position tolerance calculations, Maximum Material Condition (MMC) and least provision, self teach capability.	Vendor to Confirm			
2.8.3	Possibility to prepare the part programs directly on the workpiece as well as based on the CAD Model	Vendor to Confirm			
2.8.4	Linking of different elements should be possible				
2.8.5	Different evaluation such as distance, intersection points and conic sections etc. should be possible.	Vendor to Confirm			
2.8.6	Possibility to import CAD model for making off-line programming.	Vendor to Confirm			
2.8.7	CNC part program and parameters for CNC runs are generated during manual Measurment through teach and learn for part programming to be simplified	Vendor to Confirm			
2.8.8	Machine should have online facility to apply temperature correction. A separate temperature sensor integrated with the machine should be available for measurement of part temperature .	Vendor to Confirm			
2.8.9	Movement of the machine should be possible in work piece co-ordinate system.	Vendor to Confirm			
2.8.10	Intermediate results should be possible with graphical assistance in CAD window	Vendor to Confirm			
2.9.0	Accessories as per system requirements				
2.9.1	CNC Controller with latest programming language compatibility with Digital amplifier and Joystick	Vendor to Confirm & specify			

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2.9.2	Suitable Temperature sensors for machine and part	(vendor to confirm and specify)			
2.9.3	Geometric Measurement software(Perpetual licence)	(vendor to confirm and specify)			
2.9.4	Software for measurement of 2D & 3D Curves / Profiles	Vendor to Confirm			
2.9.5	Digitizing of unknown 2D Curves & 3D Curves (Reverse Engineering).	Vendor to Confirm			
2.9.6	Measurement of 2D Curves & 3D Curves against nominal data. The nominal data of the curve can be input manually by keying as per drawing or from the CAD files. Then the measurement is done against this nominal data.	Vendor to Confirm			
2.9.7	Deviation calculation from nominal & measured curves. (The difference between the nominal and the measured data in the normal vector direction is calculated as deviation.)	Vendor to Confirm			
2.9.8	Best fit calculation of measured curves and output of deviations	Vendor to Confirm			
2.9.9	Graphical presentation of nominal curves , measured curves & deviations	Vendor to Confirm			
2.9.10	The System should have full alpha numeric keyboard(mechanical keyboard), TFT/LED Colour display 17 " or More, additional draw-out type Querty Key Board and mouse in suitable enclosure . Serial interfaces, Parallel interface for printer, COM port for telediagnostics, network ready with LAN. Electronic, three USB ports and CD/DVD R/W for data input/output. Hard disk of sufficient capacity (large size available at the time of order shall be supplied). Graphic simulation and preinstalled system software & other required softwares etc. (Details should be submitted by Vendor). Colour Laser jet printer with automatic paper feed storage and modem.	(vendor to confirm and specify)			
2.9.11	On-line UPS 2KVA for Computer system with backup of 30minutes	(vendor to confirm)			
2.9.12	suitable rating Servo Stabilizer with Isolation Transformer	(vendor to confirm and specify)			
2.9.13	Controller/Computer Trolley in desk format	(vendor to confirm)			
2.9.14	Calibration sphere with stand with NABL Calibration Certificate	(vendor to confirm and specify)			

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2.9.15	Air Conditioning enclosure of suitable dimensions machine as per Clause 12 - 01 No	Vendor to Confirm			
2.9.16	Standard Tool Kit for basic maintenance - 01 Set	Vendor to Confirm			
2.9.17	Suitable Air Compressor Minimum 10Cfm Capacity. Make Elgi/Atlas Copco	Vendor to Confirm			
2.9.18	Spare Hard Disk for Ghost Backup	Vendor to Confirm			
2.9.19	Suitable Isolation pads and associated material for Vibration damping	Vendor to Confirm			
2.9.20	Any other items considered essential for smooth and interruption free running of the machine should also be quoted separately	Vendor to Confirm			
2.10.0	DETAILS OF CNC CONTROLLER				
2.10.1	Make : latest. PC based (with latest Windows OS) latest version, open architecture/ Renishaw /OEM make. model : Latest version as available at the time of ordering should be supplied If Industrial PC is used it should be of siemens/Beckoff/Advantech/Symantec/ equivalent make with complete details. It should be possible to use any standard industrial PC if the original PC goes defective later on.)	Vendor to Specify & Confirm			
2.10.2	Details of standard features like I++ protocol is preferred. List to be submitted.	Vendor to Confirm			
2.10.3	Details of other optional features.	Vendor to Confirm			
2.10.4	The Digital Servo Drives should be of Renishaw or equivalent make. Drive Tuning should be possible digitally/CNC Control.	Vendor to Specify & Confirm			
2.10.5	Position Feedback /Encoder elements of Axes should be Renishaw or equivalent make.	Vendor to Specify & Confirm			
3.0.0	Utilities				
3.1.0	Voltage Stabiliser and Isolation transformer should be provided for complete machine as per machine capacity. (refer 2.12)	Vendor to Confirm			
3.2.0	On-line UPS of 2KVA and 30 Minutes backup to be supplied by supplier. (refer 2.11)	Vendor to Confirm			
3.3.0	ELECTRICAL SYSTEM :				
3.3.1	415V $\pm 10\%$, 50HZ ± 1.5 HZ, Three Phase AC (3 wire system with out neutral) Power Supply Source will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Earthing of complete system will be in the scope of vendor.	Vendor to Confirm			

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3.3.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized.	Vendor to Confirm			
3.3.3	All electrical & electronic control cabinets & panels should be dust and vermin proof.	Vendor to Confirm			
3.3.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to Confirm			
3.3.5	All cables moving with traversing axes should be installed in Caterpillar/ Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to Confirm			
3.3.6	Motors shall conform to IEC or Indian Standards or equivalent	Vendor to Confirm			
3.3.7	All cables moving with traversing axes should be installed in Caterpillar/ Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to Confirm			
3.3.8	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to Confirm			
3.4.0	SAFETY ARRANGEMENTS:				
	Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to Confirm			
3.4.1	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available.	Vendor to Confirm			
3.4.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to Confirm			
3.4.3	All the pipes, cables etc. on the machine should be well supported and protected.	Vendor to Confirm			
3.4.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor to Confirm			
3.4.5	Emergency Switches at suitable locations as per International Norms are to be provided.	Vendor to Confirm			
3.4.6	Collision protection during measurements.	Vendor to Confirm			
3.5.0	COMPRESSED AIR POINTS:				
3.5.1	Air compressor with air dryer of suitable capacity with manual ON/ OFF Valve and flexible pipe of suitable length for work piece cleaning.	Vendor to Confirm			
3.5.2	Pneumatics /separate air compressor required for machine to be quoted by supplier.	Vendor to Specify & Confirm			

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4.0	FAULT DIAGNOSTIC SYSTEM:				
4.1	Supplier's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include customised auto-diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display with full video diagnostic help for faults related to mechanical and electrical maintenance. The System should be capable of telediagnostics with required / software	Vendor to Confirm			
4.2	Help guide/Manual should be provided to use both diagnostic systems.	Vendor to Confirm			
5.0	LEVELING & ANCHORING SYSTEM				
5.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc shall be supplied for the Machine as applicable.	Vendor to Confirm			
6.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE :				
6.1	Special tools and equipment required for erection of the machine shall be brought by the vendor. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc.for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer.	Vendor to Confirm			
7.0	SPARES:				
7.1	Mandatory spares Item (Mechanical/Electronics/CNC/electrical) if any required should be supplied along with main supply for trouble free operation of machine during warranty period	Vendor to confirm			
7.2	Separate list (Mechanical/Electronics/CNC/electrical) of spares along with rate, required for smooth functioning of the machines & its accessories (If Any). The list is solely required with respect to future requirements/reference of Plant. Hence total cost of items from the list should not be the part of final price of tender quote.	Vendor to Confirm			
7.3	All types of spares for total machine and accessories support should be available for atleast ten years with vendor after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required	Vendor to Confirm			
8.0	DOCUMENTATION : Five sets of following documents (Hard copies) in English language should be supplied along with the machine	Vendor to Confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	BIDDER OFFER	DEVIATION	REMARKS
8.1	Operating manuals of Machine & CNC system	Vendor to Confirm			
8.2	Programming Manuals of Machine & CNC system	Vendor to Confirm			
8.3	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also.	Vendor to Confirm			
8.4	Maintenance, Interface & commissioning manuals for CNC systems.	Vendor to Confirm			
8.5	Manufacturing drawings for all supplied tool holders, adapters, sleeves, fixtures etc.	Vendor to Confirm			
8.6	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.	Vendor to Confirm			
8.7	Detailed specification of all rubber items .	Vendor to Confirm			
8.8	Operating Manuals, Maintenance Manuals & Catalogues for supplied Job Measuring Systems, Voltage Stabilization and all supplied Accessories.	Vendor to Confirm			
8.9	PLC program print-outs with comments in English.	Vendor to Confirm			
8.10	PLC program , NC data & PLC data in soft copy on pendrive/CD	Vendor to Confirm			
8.11	Complete back-up of hard disk on GHOST CD/Pen-drive and clear written Instructions (3 copies) to take back-up and reloading of a new hard disk.Spare hard disk with complete software to be provided	Vendor to Confirm			
8.12	Complete Master List of parts used in the machine shall be submitted by the vendor.	Vendor to Confirm			
8.13	One additional set of all the above documentation in soft copy	Vendor to Confirm			
9.00	PRE DESPATCH INSPECTION OF MACHINE				
9.1	BHEL Engineers will inspect machine at vendors place for checking of following points pre despatch: a) Volumetric length accuracies test as per ISO 10360-2 for CMM. b) Volumetric probing error accuracies test as ISO 10360-2. c) Demonstration of all features of the machine, CNC control system & accessories. d) Inspection of the scope of supply.	Vendor to Confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	BIDDER OFFER	DEVIATION	REMARKS
10.0	TRAINING:				
10.1	BHEL Persons should be trained at BHEL Works for the following areas : (a) CNC Part Programming/ Technology, Use of all CNC Features, Programming for Measuring Systems & supplied accessories etc. (b) Electrical, Electronic & CNC maintenance for machine & other supplied equipments (c) Mechanical maintenance of the machine & other supplied equipments (d) Operation of the machine including software applications & other supplied equipments.	Vendor to Confirm			
10.2	Competent Hindi/English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	Vendor to Confirm			
11.0	FOUNDATION:				
11.1	Vendor shall submit the complete layout drawing for getting BHEL's approval within one month from the date of Letter of Indent (LOI)/ P.O. , whichever is earlier. Soil condition data will be furnished by BHEL alongwith the approval. The Layout should consist of all requirements pertaining to complete machine and all accessories, including space requirement for Voltage Stabiliser & any other accessory. BHEL shall construct complete foundation for the machine under supervision of supplier and at supplier's responsibility. (if required vendor can visit the site before tender submission to verify site.)	Vendor to Confirm			
11.2	The Vendor should supply suitable Isolation Pads/Dampers and associated material to BHEL if required.	Vendor to Specify & Confirm			
12.0	AC ENVIRONMENT ROOM				
12.1	CMM Room enclosure should be of suitable dimensions to accommodate the the CMM machine and its related assesories . The Room should be made of fire retardant Puff panel on fabricated structure. The Room should have sufficient quantity of double glass windows. The flooring of the Room should be epoxy coated. The room should have sufficient illumination of minimum 600 lux. The room should be provided with electrical fittings wherever needed. The electrical line diagram to be sent to BHEL before commnecment of work. Suitable arrangement should me made for placing the heavy components on the machine table by shop floor availble EOT crane.	Vendor to Specify & Confirm			

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12.2	CMM enclosure should be provided suitable for Air Conditioning system for maintaining desired accuracy.	Vendor to Specify & Confirm			
12.3	The GA drawings to be shared by vendor. BHEL will allocate the space as per GA Drawing for carrying out the civil work for the machine foundation.	Vendor to Specify & Confirm			
12.4	BHEL to provide Electric supply connection near the AC Enclosure Room with dedicated earthing as per Clause no 3.3.0.				
13.0	ERECTION & COMMISSIONING				
13.1	Supplier to take full responsibility for carrying out the erection, start up, testing of 3D CMM machine along with compressor, it's control system & all types of other supplied equipment, Erection of AC Enclosure room, measuring of test pieces etc. Service requirement like power & oil shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings. Other requirements like crane along with operator shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Vendor to Confirm			
13.2	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. (refer cl. 16.0)	Vendor to Confirm			
13.3	Special Tools, Tackles, instruments and other necessary equipment if required to carry out all above activities should be brought by the supplier.	Vendor to Confirm			
13.4	Commissioning spares, required for commissioning of the compressor within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to Confirm			
13.5	All cover plates required for the machine and its peripherals including pits, if any, shall be supplied and installed by the vendor.	Vendor to Confirm			
13.6	Portion, if any, of the compressor, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colours of paint used.	Vendor to Confirm			

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13.7	Suitable offer for AMC for a period of min. 5 years after warranty to be quoted separately. This offer is optional for BHEL	Vendor to Confirm			
13.8	The machine with accessories should be supplied with levelling & aligning jacks bolts, base plate, foundation bolts and anchoring materials etc.	Vendor to Confirm			
13.9	Supplier should prove the measurements on minimum five nos of BHEL provided components at BHEL Jhansi works for ensuring the accuracy/resolution/repeatability etc	Vendor to Confirm			
14.0	ACCURACY TESTS:				
14.1	GEOMETRICAL ACCURACIES :				
14.1.1	Geometrical Accuracy Tests shall be in accordance with relevant standard. Copy of applicable standard should be furnished. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the technical offer. All the accuracies to be proved as per the standard ISO 10360 at site and at manufacturers end.	To be submitted			
14.1.2	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance tests at Suppliers works and during Erection & Commissioning at BHEL Works. The eqpt. is to be completely tested and inspected before despatch and four copies of inspection certificates, accuracy and calibration charts are to be provided with machine.	Vendor to Confirm			
14.1.3	MACHINE volumetric length, probing error accuracy & repeatability: Should be measured as per international standards (ISO 10360 for CMM)	Vendor to Confirm			
15.0	AMBIENT CONDITIONS & THERMAL STABILITY :				
15.1	Total machine including CNC system and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies. Power Supply: Voltage: 415 V - 10%, +10% Frequency: 50 Hz +1.5%, -1.5% No. of phases = 3, 3 wire , no neutral. Ambient Conditions: Temperature = 5 to 50 degree celsius Relative Humidity = 95% max.	Vendor to Confirm			
15.2	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by vendor. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same should be furnished by Vendor)	Vendor to Confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	BIDDER OFFER	DEVIATION	REMARKS
15.3	The machine, including attachments and accessories, should be suitable for 24 hrs. continuous operation to its full capacity for 24 hour a day and 7 days a week throughout. Vendor to ensure and confirm the same.	Vendor to Confirm			
15.4	Machine should have facility for compensation of temperature correction .	Vendor to Confirm			
16.0	PROVEOUT OF VANDE BHARAT BOGIE COMPONENTS/ SUB-ASSEMBLIES PARAMETER :				
16.1	Vendor shall be fully responsible for prove out of acceptance test of the machine with calibrated GAUGES / MASTER as per international norms. Vendor should also prove machine capability . vendor shall be responsible to prove out the Vande Bharat Bogie Sub assemblies and its components as per BHEL provided drawing in CNC part programming for automatic measurements at BHEL works. proveout components shall be provided by BHEL. Vendor shall be fully responsible for dimensional measurements and related form & position tolerances of prove out components as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by vendor, regarding accuracy requirements of the proveout components, whether specified or not, should be discussed and cleared by vendor during initial technical discussions.	Vendor to Confirm			
16.2	Vendor shall be responsible for any deviation/rejection in proveout component due to any machine error malfunctioning of the machine during proveout and also for the delay in measuring due to improper recommended tooling etc. The cost of such deviation / rejection, if any, shall be refunded by the vendor to BHEL.	Vendor to Confirm			
17.0	MACHINE ACCEPTANCE: (Tests/Activities to be Performed at Vendor works)	Vendor to Confirm			
17.1	Tests/Activities should be carried out at supplier's works on the machine before dispatch :	Vendor to Confirm			
17.2	Measuring uncertainty, accuracy, thermal stability as per ISO 10360-2	Vendor to Confirm			
17.3	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to Confirm			
18.0	Test to be carried out at BHEL works while commissioning the machine :				
18.1	Measuring uncertainty as per ISO 10360-2	Vendor to Confirm			
18.2	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to Confirm			

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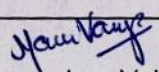
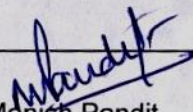
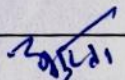
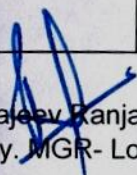
SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	BIDDER OFFER	DEVIATION	REMARKS
19.0	PACKING:				
19.1	Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is despatched in containers, all small loose items shall be suitably packed in boxes.	Vendor to Confirm			
20.0	GUARANTEE :				
20.1	The Equipment shall be guaranteed by the Vendor for a period of 24 (twenty four) months from the date of successful commissioning & acceptance of the Equipment by the Purchaser.	Vendor to Confirm			
21.0	GENERAL : The vendor should submit the following information:	Vendor to specify			
21.1	Machine Model	Vendor to specify			
21.2	Total connected load (KVA):	Vendor to specify			
21.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to specify			
21.4	Painting of Machine/ Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to confirm			
21.5	Total weight of the machine	Vendor to specify			
21.6	Weight of heaviest part of machine	Vendor to specify			
21.7	Weight of the heaviest assembly/ subassembly of the Machine	Vendor to specify			
21.8	Dimensions of largest part/ subassembly/ assembly of the machine	Vendor to specify			
21.9	Vendor to submit, along with offer, the reference list of customers where similar machines have been supplied mentioning the customer, Machine Model, major specifications of the supplied machine, CNC System, Year of Supply etc .	Vendor to Confirm			
21.10	Detailed catalogues , sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor to Confirm			
21.11	Pneumatic pipings should be preferably metallic except places where flexible pipings are essential.All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to Confirm			
22.0	QUALIFYING CONDITIONS :				
22.1	A.Only those vendors(OEM), who have supplied and commissioned at least One 3D CMM machine of same or higher size with exact or better accuracy/resolution in the past 7 years and such Machines are presently working satisfactorily for more than one year after commissioning should quote.The following information is to be submitted by the vendor about the companies.where similar machines have been supplied.This is required to all the vendors for qualification of their offer.	Vendor to Confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	BIDDER OFFER	DEVIATION	REMARKS
	1. Purchase order copy(unpriced) for supply of 3D CMM during last seven years from the date of this enquiry	Vendor to specify			
	2. Performance certificate from the customer of the same machine for min. one-year satisfactory operation of machine from date of this enquiry	Vendor to specify			
	OR				
	B.OEM authorized dealer or OEM partner(OEM as per 'a'), who have supplied and commissioned at least one 3D CMM machine of same or higher size with exact or better accuracy/resolution in the past 7 years and such Machines are presently working satisfactorily for more than one year after commissioning should quote. The following information is to be submitted by the vendor about the companies where similar machines have been supplied. This is required to all the vendors for qualification of their offer.	Vendor to Confirm			
	1. Purchase order copy(unpriced) for supply of 3D CMM during last seven years from the date of this enquiry	Vendor to specify			
	2. Performance certificate from the customer of the same machine for min. one-year satisfactory operation of machine from date of this enquiry	Vendor to specify			
	3. Valid authorization certificate from OEM to be submitted.	Vendor to specify			
	The following information to be submitted by the vendor about the companies where such machines have been supplied a. Name of customer/company where such machine is installed b. Complete postal address of the customer/company c. Year of commissioning d. Application for which machine has been supplied e. Name and Desg. of contact person of the customer(Phone & mail address)	Vendor to specify			
22.2	This is required from all the vendors for qualification of their offer.	Vendor to Confirm			
22.3	Vendor must have established set up for support on service, spares & applications with in indian territory so that earliest service related (operational, maintenance & spares) support can be obtained at BHEL Jhansi. A detailed documentation on the same to be submitted.	Vendor to Confirm			
23.0	Delivery and Erection & Commissioning schedule				
23.1	Vendor to submit all drawings related to civil foundation, GA drawings, technical specs and machine drawing within 30 days from the date of PO/LOI	vendor to confirm			
23.2	Vendor to supply of All items as per PO after Approval of Drawing from BHEL within 4 months	Vendor to confirm			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	BIDDER OFFER	DEVIATION	REMARKS
23.3	Installation and commissioning after material supply and intimation from BHEL to vendor - 45 days	Vendor to confirm			
24.0	NETWORKING:				
24.1.0	Machine control should have necessary hardware and software for interfacing with gigabit Ethernet Local Area Network with 100 MB/sec through UTP cables for CNC program and other related data transfer. This network to be connected to wide area network/Internet. The networking should have following capabilities.	Vendor to Confirm			
	a) The machine shall appear as a node in the Entire Network. (Network Neighborhood)	Vendor to Confirm			
	b) The program transfer shall be by simple copy and paste method provided sharing access is allowed between any PC and the machine across the network.	Vendor to Confirm			
	c) The program transfer between CNC system and network should also be possible in CNC Mode.	Vendor to Confirm			
25.0	Vendor to sign Non-disclosure agreement for drawings provided with enquiry in BHEL Jhansi provided format.	Vendor to Confirm			
<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  Manmohan Vaishya (Sr. MGR-WEX) </div> <div style="text-align: center;">  Manish Pandit (MGR-LMM) </div> <div style="text-align: center;">  Ankur Gupta (MGR-LME) </div> <div style="text-align: center;">  Rajeev Ranjan (Dy. MGR- Loco Quality) </div> </div>					