

Sections V

Tender No : -----

CNC-TANDEM UNDER FLOOR WHEEL LATHE (BG) to Specification No.CR/IR/CNC-TUFWL (BG)/ WITH WORKS / WITH WORKS/2024

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In case, any of the conditions mentioned hereunder are contrary to those mentioned elsewhere in the tender document, conditions mentioned in this document shall supersede the corresponding conditions given elsewhere in the tender document.

Section-V

ABBREVIATIONS

A-1,A-2,A-3,A-4	Standard paper sizes
AC	Alternating Current
CAMC	Annual Maintenance Contract
ASA	American Standards Association
AT	Acceptance of Tender
BIS	Bureau of Indian Standard
BG	Bank Guarantee
CE	<i>Conformité Européenne/</i> European Conformity – Conformity to European Community Directives
PCME	Principal Chief Mechanical Engineer
CNC	Computer Numeric Control
CR	Central Railway
PCMM	Principal Chief Material Manager
Db	Decibel
DC	Direct Current
DIN	<i>Deutsches Institut für Normung/</i> German Institute for Standardization –German Standards
PFA	Principal Financial Advisor
Sr.DFM	Senior Divisional Finance Manager
DY.FA &CAO	Deputy Financial Advisor & Chief Account Officer
GA (Drawing)	General Arrangement(Drawing)
HRC	Hardness Rockwell ‘C’ Scale(value)
Hz	Hertz
IEC-Pub	International Electrotechnical Commission-Publication
ISO	International organization for standardization
JCN	Joint Commissioning Note
JIS	Japanese Industrial Standards
JRI	Joint Receipt Inspection
KW	Kilo Watt
LC	Letter of Credit
LD	Liquidated Damages

LOA	Letter of Acceptance
NC	Numeric Control
NEMA	National Electrical Manufacturers Association
NIT	Notice Inviting Tenders
PBG	Performance Bank Guarantee
PDF	Portable Document Format
PLC	Programmable Logic Controller
PTC	Proving Test Certificate
PU	Production Unit (Any of the Railway Production Units e.g. RCF, ICF etc.)
RDSO	Research Design & Standards Organization
SS	Stainless Steel
WBG	Warranty Bank Guarantee

1	BASIC DESIGN FEATURES :
1.1	SAFETY FEATURES:
1.1.1	The machine shall incorporate all safety devices so as to provide complete protection to the operator and machine. Some of the important safety features (which have to necessarily be provided but not be limited on the machine) are mentioned below :-
	i. Protection against movement of vehicle when retracting rails are not locked.
	ii. Automatic tool retraction device to withdraw the tool in the event of sudden power failure.
	iii. Arrangement to ensure adequate support to the vehicle in the event of sudden power failure or failure of the hydraulic system. In these eventualities, the vehicles shall continue to be securely supported.
	iv. Protection against faulty sequence of operation.
	v. Two mushroom type emergency stop buttons on both sides to enable stopping of the machine in an emergency. The emergency stops shall override all other controls.
	Note: The offer should give details of all safety features present in the machine.
1.2	SPECIFIC CHARACTERISTIC: CNC Tandem Under floor wheel lathe shall consist of two CNC under floor wheel lathes installed parallel to each other, out of which one machine shall be fixed and other moveable to maintain center distance between wheel sets as per clause 2.2.1.6 of leading parameters as per Schedule-IV. Movement of moving machine shall be controlled by CNC controls of one of the machines. Both machines shall work simultaneously or independently as required. Both machines shall be in dual column construction, rigidly connected by cross rail. Critical elements of machine-like beds, columns, cross rail, tool slides subjected to cutting loads shall be in cast construction to enable vibration damping and durability. Details shall be explained with the help of drawings.
1.2.1	GENERAL:
	The general characteristics of the machine shall be as per clause 3 of section V
1.2.2	Hauling System:
1.2.2.1	Rail cum Road Shunter (common for both machines in tandem configuration):
1.2.2.1.1	A suitable arrangement of remotely operated Rail cum Road shunter with the following key features shall be provided: Battery operated Rail cum road vehicle (shunter) shall: <ul style="list-style-type: none"> • Operate on rail tracks as well as leveled roads: maximum mode changeover time from rail to leveled road is 2 minutes and vice versa. • Used for shunting purposes only at Railway Shed/ Depot/ workshops. • Generate up to 15 KN of pulling force. • Towing capacity: 135 T • Fully remote-controlled operation • Able to rotate at 360 degrees at the same place • Able to pull the load for gradient value ranging from 'level' to 1 in 400 (max.) • One side fitted with CBC, and the other side fitted with screw coupling. • Height of coupling above rail level shall be 1090 +15/ -5 mm.

	<ul style="list-style-type: none"> The shunter should have provision of independent fail- safe braking system. In addition, there shall be provision of parking brake. <p>However, the bidder shall provide full technical details of the Battery operated Rail cum Road vehicle (Shunter).</p>
1.2.2.2	Winching Arrangement (Winch):
1.2.2.2.1	A suitable arrangement like a winch without using the power of the vehicles for hauling vehicles into and out of the machining positions shall be provided. The device shall be capable of hauling vehicles having tare weight upto 135 tonnes. Full technical details of the device including make and model, power rating, capacity, etc. shall be furnished in the bid
1.2.2.2.2	The hauling device shall be provided with a hand actuated emergency operation system such as a hand crank, which can be used in the event of failure of the hauling device. Arrangement shall be provided to ensure that the motor remains disengaged when the hand actuated system is being used.
1.2.2.3	An arrangement to locate the vehicle along the rails so that the wheel for machining is in the correct position shall be provided. Arrangement to be provided shall be explained in detail with a sketch in the bid.
1.2.3	Lifting and Positioning System individual for each machine:
1.2.3.1	A hydraulically actuated lifting system shall be provided to relieve the vehicle axle load from the retracting rails to enable its withdrawal. The retraction of rails shall be power operated through a push button. Retractable rails shall be included in the scope of supply.
1.2.3.2	A suitable wheel centering and positioning arrangement shall be provided for locating the wheel set with respect to wheel flanges. The wheel support arrangement shall be such that when lifted by the drive rollers, the wheel set will be positioned accurately with respect to centre line of machine in order to ensure that the machined wheels are within the specified tolerances as per clause 2.3.4 of section IV. The arrangement provided shall be explained in details with a schematic diagram in the bid. Details such as material composition and load bearing capacity of the rollers shall also be provided.
1.2.3.3	Suitable arrangement shall be provided so that jacks (supports) controlled and guided by CNC system can be incorporated below the axle box to enable the profiling of wheel sets with reference to the axle box bearing centre. The jacks shall be supported on kinematically rigid members to keep the axle box-bearing centre fixed during the entire machining operation. Separate hold down devices as per clause 1.2.14 of section V shall be provided on either side. Each axle box shall be supported on jack and simultaneously held by hold down device from top. The arrangement shall be explained in detail with the help of drawings & sketches.
1.2.3.4.	Suitably designed hydraulically operated holding arrangement having two rollers shall be provided on either side for firm lateral holding of the wheel set.
1.2.3.5	Details of the above arrangement provided for positioning the wheels in vertical and horizontal planes, and in the lateral direction shall be explained in detail with sketches in the bid.
1.2.4	Drive System individual for each machine:
1.2.4.1	An independent drive units shall be provided for both wheels of wheel set. Both side drive units shall be fully synchronized. Details of arrangement provided shall be explained in the bid.
1.2.4.2	Drive to the wheels shall be from a set of two drive rollers on either side. Drive rollers shall be of suitably heat-treated alloy steel. Each drive roller shall be driven by independent drive motor. Drive motors of all the four drive rollers shall be

	electronically synchronized. Distance between the drive rollers shall be designed to accommodate all wheel sets indicated in drawings at Annexure-E of section VI. Material specification, hardness and surface finish of the drive rollers shall be indicated in the bid. Type, size and make of bearings shall also be indicated in the bid. Provision of detecting slip between drive rollers and wheel set shall be provided. Arrangement shall be explained in the bid.
1.2.4.3	It shall be possible to change the speed of the drive rollers during machining without stopping the machine to facilitate cutting through work-hardened spots. The method of speed control shall be explained in the bid.
1.2.4.4	The drive rollers shall be fully floating to enable them to follow the worn-out tread profile without losing contact with the wheel. Arrangement provided shall be explained in detail in the bid with sketches.
1.2.4.5	The machine shall be provided with a complete set of drive rollers fitted on the machine.
1.2.4.6	Detailed design calculations for cutting force at minimum and maximum depth of cut and feed rate shall be furnished in the bid.
1.2.5	Measuring System individual for each machine:
1.2.5.1	Probe type measurement system shall be incorporated in the machine for pre and post machining measurement of wheel sets. It should be suitably integrated with the CNC system of the machine. Suitable arrangement for protection of the probes shall be made. The bidder shall furnish constructional details of the measuring system along with the following details: <ol style="list-style-type: none"> a. No. and types of measuring probes. b. Make and model no. of measuring system/probes. c. Working principle of the measuring system to be explained with schematic drawings/images.
1.2.5.2	The measuring system shall be capable of taking the following measurements: <ol style="list-style-type: none"> i. Tread diameter at defined location (63.5mm from wheel face) ii. Wheel gauge (Distance between inner faces) iii. Flange thickness iv. Flange height v. Tread profile vi. Radial run out of wheel at tread diameter vii. Face run out of inside face of wheel
1.2.5.3	Computer based data acquisition and storage system shall be provided to store machining parameters. The system shall have a panel mounted computer with Window based software. The configuration and make of computer, monitor and printer shall be indicated in the bid.
1.2.5.4	One Master wheel set shall be supplied by the firm along with the machine. Master wheel set shall be machined out of the wheel sets taken from the consignee. The Master wheel set shall be used for setting up measuring system of machine as per recommended frequency. Method of setting up, time taken in setting up and the recommended frequency for setting up of measuring system shall be explained in the bid.
1.2.5.5	The system should be equipped with internal communication interfaces through Ethernet or profibus communication and pre-loaded with remote diagnostic system software and communication hardware. High speed internet connection shall be provided by the consignee at site near the machine, for this purpose. All charges pertaining to installation and use of High speed internet connection shall be borne by the consignee.
1.2.6	Cutting depth determination system individual for each machine:

1.2.6.1	The CNC system shall be capable of performing automatic cutting cycle with integrated feedback system. Arrangement provided shall be explained in the bid.
1.2.6.2	CNC system should include software capable of turning any wheel profiles from minimum flange thickness to maximum flange thickness as given in the wheel profiles in drawings at Annexure-E of Section VI. Software should be user friendly and adequate training should be given to the nominated staff to generate part programme of new profiles.
1.2.6.3	The machine shall be provided with a CNC based system to determine minimum metal removal necessary to achieve the required profile. The system shall be capable of comparing the wear level of all the wheels of the wheel sets of each bogie and deciding the precise diameter along with minimal metal removal required for turning. It should be possible to define maximum permissible variation in the tread dia. of two wheels on the same axle, any two wheels on the same bogie and on any two wheels of both the bogies. Arrangement provided shall be explained in the bid.
1.2.6.4	When both machines working in tandem mode, pre-measurement data shall be shared with each other to determine minimum metal removal necessary considering wear condition of four wheels of one bogie to achieve the required profile.
1.2.6.5	The required diameter shall be indicated on the screen for the operator to take corrective action, if required. Based on this decision, the CNC system shall calculate the economical distribution of cuts in order to process the re-profiling in a rough & finish cut.
1.2.6.6	In case the operator selects the target diameter, then the system shall do a feasibility check of all parameters before accepting the execution of cutting under selected parameters in order to avoid any collision of the tool post with the job.
1.2.6.7	Suitable display system to indicate the tread diameter of both wheels before and after turning shall be provided. Arrangement provided shall be explained in the bid.
1.2.6.8	The system shall be located so as to be clearly visible to the operator from the normal machine operating position.
1.2.7	Tread profile machining system individual for each machine:
1.2.7.1	The machine shall be provided with a CNC controlled profiling system. It shall be capable of automatic machining of both wheels of a wheel set simultaneously. The feed of the right hand and the left hand tools shall be synchronized. The drive to both axis of both the tool posts shall be through servo motors connected to ball screw through servo gearbox. The profiling system shall ensure constant chamfering irrespective of the wheel set width variation. Tool slides shall be equipped with hardened & ground box guideways and mating slide ways lined with extremely wear resistant PTFE liners like SKC for stick slip free movement. The chips generated during machining shall be conveyed through chip conveyor. System provided for the same shall be explained in the offer.
1.2.7.2	The CNC system shall generally conform to clause 1.2.18 of Schedule-V; however, feature exceeding those specified in this schedule or different in case of compatibility problem shall be acceptable.
1.2.7.3	The CNC system should ensure automatic positioning of the tools during machining cycle.
1.2.7.4	The profiling unit shall be capable of independent rapid traverse and slow feed motion.
1.2.7.5	The CNC profiling system shall be capable of turning the inner faces of wheels in continuation with the turning operation for wheel profiling.
1.2.7.6	Provision of brake disc machining shall be provided for LHB wheel sets on both the tool

	posts. It shall consist of quick change tool holder which can be installed in place of wheel profiling tool holder. One number tool holder of each type and 50 nos. inserts of each type shall be supplied along with the machine.
1.2.8	Tooling individual for each machine:
1.2.8.1	Throw away carbide inserts with built-in chip breakers shall be used for all machining operations specified in cl.-2.1 of section IV for all wheel profiles mentioned in drawings at Annexure-E of Section VI. The successful bidder shall be required to supply detailed drawings of tool holders and tool inserts with part list nos.
1.2.8.2	The location of cutting tools shall be between the two driver rollers.
1.2.9	Hydraulic System individual for each machine:
1.2.9.1	The hydraulic power pack, reservoir, pumps, valves, gauges etc. shall be conveniently located to facilitate maintenance. The hydraulic power pack and all hydraulic elements shall be of compatible makes. Type, make and model no. of each hydraulic element shall be indicated in the bids.
1.2.9.2	The hydraulic system shall necessarily have the following: <ul style="list-style-type: none"> i. Pressure gauges wherever pressure is to be set or monitored. ii. Safety valves if the relief valve does not fulfill this function. iii. Temperature indicators wherever temperature is to be monitored. iv. Clogging indicator for filters.
1.2.9.3	The sump aggregate shall have the following: <ul style="list-style-type: none"> i. Dust proof cover ii. Indicator to indicate minimum and maximum oil level in the sump iii. Filters to prevent ingress of dust/dirt into the hydraulic system iv. Drainage connection to drain out the complete oil without disconnecting any pipe.
1.2.9.4	A suitable maintenance free, chiller type heat exchanger of adequate capacity shall be provided to ensure that the hydraulic oil temperature does not exceed 50 degree C. Arrangement shall be provided to automatically connect the hydraulic system to the heat exchanger if oil temperature exceeds 45 degree C. The details of system shall be furnished in the bid.
1.2.10	Electrostatic oil filtration equipment individual for each machine:
1.2.10.1	In addition to regular filters (incorporated in the hydraulic system) suitable for filtering particles of size 10 micron and above, an Electrostatic oil filtration equipment with provision of moisture absorption shall also be provided. It will draw oil from tank and return it after passing through filtration media. Suspended particles of size more than 0.1 micron present in hydraulic oil, shall be removed from oil through the Electrostatic oil filtration equipment. Details of equipment shall be furnished in the offer.
1.2.11	Lubrication System individual for each machine:
1.2.11.1	An automatic adjustable centralized grease lubrication system shall be provided for lubrication sliding parts. The system shall be complete including pump, level indicator, metering cartridges / progressive blocks etc.

1.2.11.2	Arrangement shall be provided to indicate failure of the lubricating system and protecting the machine. i. Periodicity of cleaning/replacement of filters ii. Periodicity of replenishing lubricating oil in the sump
1.2.11.3	The lubrication system shall be explained in the bid with a lubricating diagram.
1.2.12	Swarf disposal system (common for both machines):
1.2.12.1	A suitable conveyor type Swarf disposal system to remove the swarf from the wheel lathe pit to outside storage place shall be offered. The constructional details along with motor horsepower, drive arrangement, material specifications, make and space requirement of the system should be furnished and the operation explained with a schematic diagram in the bid.
1.2.12.2	Chip Crusher individual for each machine: Chip Crusher shall be provided to crush the chips generated during wheel machining operation. The chip crusher shall be mounted below the machine before chip conveyor with suitable hoppers and shall be capable of handling the volume of chips generated during the machining operation. It shall be box type of steel casing with number of high-grade steel blades running at slow speed. Suitable safety measures shall be incorporated to handle blocking situation. Details of arrangement chip crusher arrangement and safety measures shall be furnished in the offer.
1.2.13	Controls individual for each machine:
1.2.13.1	All functions of the machine shall be controlled from a centralized ergonomically designed control panel through push buttons and selector switches. The control panel shall be placed so as to enable a full and clear view of the cutting points and the drive rollers to the operator. Additional controls one on either side shall be provided on each side for operation of jack & hold down device.
1.2.13.2	Suitable low voltage industrial grade lighting shall be provided to illuminate the cutting points and operating controls.
1.2.14	Hold-down Device individual for each machine:
1.2.14.1	A suitable hydraulic hold-down device for machining of independent wheel sets with respect to the centre line of the axle box bearings shall be provided, one on each column. The device shall be precision guided in the machine column and shall have vertical movement through hydraulic cylinders. These cylinders shall be designed to provide adequate axle load on the axle box while machining independent wheel sets or wheel sets with low axle load. Arrangement shall be explained in details with drawings & sketches.
1.2.14.2	Axle Box Support Jack individual for each machine: A suitable axle box support jack independent of hold down device shall be incorporated for providing rigid support to the axle box to enable machining of wheel set. It shall be controlled through CNC controls. Arrangement shall be explained in details with drawings & sketches.
1.2.15	Covered shed for housing CNC Tandem under floor wheel lathe:
1.2.15.1	A covered shed for housing the complete Tandem under floor wheel lathe is to be constructed on turn key basis including detailed design engineering, excavation and construction work on the piece of land provided by the consignee.
1.2.15.2	The bidder will have to get detailed design approved by the Govt. approved agency/structural engineer. The structural design shall take into account various site conditions including wind pressure.

1.2.15.3	The size of shed is 50M long and 15M wide. The roof of the shed is sloping from the centre towards both the side walls. Height of the roof at the centre and on the side wall is about 9 meters and 8 meters respectively.
1.2.15.4	The roof of the shed is to be with trusses and covered with pre-coated sheets of minimum 0.5 mm TCT. Adequate no. of transparent sheets shall be provided in the roof for providing natural light in the shed.
1.2.15.5	Heavy duty RCC flooring excluding the pit area is to be provided in the shed. The flooring shall be industrial grade flooring of at least 100mm depth PCC and 200mm depth of RCC.
1.2.15.6	Adequately spaced columns shall be provided on the side of the shed. These columns should be of RCC/PEB construction. Brick masonry wall shall be provided on all 4 sides (excluding the gate/shutter area on the two sides) of the shed upto a height of 3 meters with provision of metallic windows. Above the height of 3 meter to the edge of roof the side wall is covered with pre-coated sheets of minimum 0.5 mm TCT mounted on mild steel structure.
1.2.15.7	All civil engineering works connected with construction of the shed is in the scope of the bidder.
1.2.15.8	Necessary illumination in the shed shall be provided. The average illumination of 150 lux shall be maintained in the shed and average illumination of 300 lux shall be maintained in the in pit area. Necessary electrical wiring with switches for the lamps/fixtures shall be provided.
1.2.15.9	One room for CNC Tandem under floor wheel lathe staff:
	i) One room of size 4 meter length X 3 meter width and 3 meter height is also in the scope of work of shed required for operating and maintenance personnel. This room is constructed within the shed in one of the corner.
	ii) Side wall shall be constructed by brick masonry with adequate column and RCC slab on the roof.
	iii) The room shall have provision of doors with lock.
	iv) Electrical wiring with switches for two lights, one ceiling fan and two 5 ampere sockets are to be provided in the room.
	v) Adequate no. of glass windows with metallic frames shall be provided in the side walls for natural light and ventilation.
1.2.15.10	The shed is provided with manually operated mechanized rolling shutter on two sides (entry and exit side of the shed). The sizes of the rolling shutter should be sufficient for passing in and out of the locomotives. Firm to mention the size of the shutters in the offer. Note : The sizes of shed and room mentioned above may change. Hence the firm should quote the total cost as per clause and also quote per sq. ft. cost for shed and room separately.
1.2.16	Linkage of Track:
1.2.16.1	The scope of work will also include laying and grouting the rails in the flooring from the edge of the machine pit to the edge of shed for the movement of locomotive/coach/wagon. Further laying of rails to connect with the existing lines in the shed / workshop (excluding points turnouts and crossings) shall also be done by supplier

	only using ballast and sleepers.
1.2.16.2	The bidder shall quote for per meter length of the laying of the track inside the shed area and outside the shed area (from the edge of the shed to the point of linking of the existing track in the shed/workshop) separately. The total track length will depend on the actual site conditions. Necessary rails, sleepers, elastic clips, ballast, murrum etc. and other fittings required for the same is supplied by the Railways near the site of installation.
1.2.16.3	In case the rail/tracks on either side of shed already exist, it is the sole responsibility of the bidder/supplier to ensure that machine rail level matches with shed rail level. In case the supplier is not able to match the machine rail level, he will undertake to lay fresh rail/track on either side of the shed matching with machine rail level at his own cost to the satisfaction of the consignee. Type of rail/track to be laid by the bidder is similar to the existing track.
1.2.17	Power supply connection:
1.2.17.1	The bidder shall also provide the electrical connection from the transformer in the shed/workshop to the shed of the Tandem under floor wheel lathe for operation of the machine and lighting in the shed. The electrical cables is laid underground with suitable single brick protection on three sides. The provision of transformer and enhancement of the load (if required), is in the scope of consignee. The cable shall be armored cable of three and half core of minimum 240 sq. mm diameter to IS: 694 latest or equivalent international standard to withstand the total load of the shed and machine. Firm should give details of the cable, IS and make in the offer.
1.2.17.2	The cost of laying of cable (including material cost) shall be quoted on per meter basis. The total length will depend on actual site conditions.
1.2.17.3	All the necessary electrical equipments like distribution board and control panel etc. to be provided by the bidder.
1.2.18	CNC CONTROL SYSTEM FOR EACH MACHINE
1.2.18.1	The machine shall be provided with a micro processor based CNC control over the number of axes adequate for the capability of the machine mentioned at para 2.3 of section IV above. Simultaneous control over these axes shall be available. (No. of axes provided shall be indicated in the bid).
1.2.18.2	There shall be provision of a LCD/TFT screen of app. 200mm screen size.
1.2.18.3	Status output shall be available on the LCD/TFT screen indicating automatic operation mode selected, manual operation mode selected, automatic operation status, program edit status, axis movement/dwell status, auxiliary function, spindle speed, feed rate, tool offset, emergency stop. Current position display giving position in local co-ordinate system, work co-ordinate system, machine co-ordinate system and residual amount of movement shall be provided.
1.2.18.4	It shall be possible to operate the machine automatically through memory and/or MDI.
1.2.18.5	Facility of machine lock, machine lock on each axis, auxiliary function lock and dry run shall be available for checking the program.
1.2.18.6	The CNC control shall perform various diagnostic checks and display error status in English text.
1.2.18.7	Data protection key shall be provided. It shall prevent the program offset parameters, data etc. from being registered, modified or deleted erroneously.
1.2.18.8	Part program editing and background editing shall be available.
1.2.18.9	The possible number of registered programs shall be 50 minimum. CNC user memory for program and data should be 2GB or more.

1.2.18.10	Facility for program search using program name or program number shall be available. It shall be possible to select the sequence number required to be searched.
1.2.18.11	It shall be possible to store program number and program name for identifying the program. The number of characters in program name shall be indicated.
1.2.18.12	For symmetrical work pieces, facility of programmable mirror image shall be available.
1.2.18.13	To facilitate programming, it shall be possible to program angles, chamfers, corner rounding values from machining drawings by direct input of these values.
1.2.18.14	For repetitive machining particular to the type of machine built in boring, turning, facing, grooving and drilling cycles shall be provided.
1.2.18.15	To facilitate programming of family of similar work pieces, custom macro/parametric functions shall be available.
1.2.18.16	Stored stroke limit shall be provided thus enabling creation of forbidden zones where the cutting tool may not travel.
1.2.18.17	It shall be possible to return the machine tool to the reference point through program commands as well as manually.
1.2.18.18	Facility of optional block skip shall be available. It shall be possible for the operator to skip a block at his discretion.
1.2.18.19	Provision of 100 tool offsets to compensate for the difference of tool actually used to the imaginary tool used in programming shall be available. It shall also be possible to enter tool offsets through programmable command.
1.2.18.20	Compensations for cutter radius, tool length and tool nose radius shall be available (Nos. shall be indicated in the offer).
1.2.18.21	It shall be possible to control the movement of tool with respect to machine zero through the machine co-ordinate system.
1.2.18.22	It shall be possible to set up work co-ordinate system using tape command. It should also be possible to set up adequate number of work co-ordinate systems (app.6) through the MDI and select any of these in the program.
1.2.18.23	It shall be possible to set up local co-ordinate systems with respect to work co-ordinate systems which have been set up through MDI.
1.2.18.24	Absolute/incremental programming shall be available. It shall be possible to use both of them in the same block.
1.2.18.26	The input resolution (least input increment) should be 0.01mm or 0.001mm (selectable) for linear axes. The position control resolution (least command increment) shall be 0.01mm or 0.001mm (selectable) for linear axes.
1.2.18.27	It shall be possible to move the machine tool along any axis in incremental mode. The increment shall be selectable (0.001mm, 0.01mm, 0.1mm and 1mm).
1.2.18.28	For precise adjustment of the feed rate, provision of manual pulse generator shall be available.
1.2.18.29	For spindle speed and feed rate, manual over-ride shall be available from 50-120% for speed and 0-120% for feed.
1.2.18.30	Input shall be in metric system.
1.2.18.31	Linear/circular interpolation shall be available.
1.2.18.32	Feed rate command shall be available in mm/min.
1.2.18.33	The manufacturer's infrastructure for repair and maintenance of controls in India, in particular for repair of PCBs/ Modules shall be commented upon in detail in the offer.
1.2.18.34	CNC control cabinets shall be suitably air-conditioned.
1.2.18.35	Facility of buffer storage shall be available in the control so that machine waiting time

	is avoided while the next programmed instruction is being read into the control system.
1.2.18.36	Provision of pitch error compensation and backlash compensation shall be available.
1.2.18.37	The part program shall be protected in the event of power failure. Automatic tool withdrawal facility in the event of power failure shall also be available.
1.2.18.38	RS 232 C port / USB 2.0 / Ethernet or better port to directly download programs from PC shall be provided.
1.2.18.39	CNC control should indicate run hours.
1.2.18.40	Constant surface speed programming shall be available.
1.2.18.41	Emergency stop button provided on the panel should stop all the machine movements if operated.
1.2.18.42	Parametric program should be available.
1.2.19	Industry 4.0 Features for each machine in Tandem configuration:
1.2.19.1	<p>REMOTE PERFORMANCE MONITORING:</p> <p>CNC system should be able to monitor parameters of CNC and other machine components. CNC parameters and data like axis and drive data etc. and data of machine from the sensors/probes additionally installed for monitoring health of machine as enumerated in clause 1.2.19.3.1.1 to 1.2.19.3.1.14 etc.</p> <p>After loading the wheel set on the machine, pre inspection shall be carried out. Wear data and diameter of individual wheel of the wheel set as measured should be recorded in Excel format with respect to the wheel set identification number and real time clock of CNC system of the Machine. Similarly, after completing the wheel profiling operation, diameter of individual wheel of the wheel set shall be measured and recorded. Similarly, machined wheel profile type shall also be recorded. Both these records shall be stored in Excel format with respect to the wheel set identification number and real time clock of CNC system of Machine. Via high speed internet connection through Ethernet (LAN) cabled connection or 3G / 4G wireless internet connection, this wheel set pre and post inspection data shall be remotely accessible to authorized representatives of consignee and emailed to designate email ids at the pre-determined time frequency. Necessary hardware and software shall be supplied by machine manufacturer. However, high speed internet connection as detailed above has to be arranged by consignee.</p>
1.2.19.2	<p>REMOTE DIAGNOSTICS:</p> <p>Using remote diagnosis feature CNC controls of the machine shall be connected to remote computer located at manufacturer's service centre using the high-speed internet connection. This high connection. This high-speed internet connection can be established using Ethernet (LAN) cabled connection or 3G /4G wireless plug and play telephony (dongle) or router connected to CNC controls. Necessary hardware and software required for this remote diagnosis shall be provided by machine manufacturer, however, high-speed internet connection as detailed above needs shall be arranged by consignee. Remote computer of manufacturer shall also be connected to high speed internet connection using above methods. Remote computer and its internet connectivity shall be managed by the machine manufacturer. Suitable software like 'Team Viewer / eWON' shall be used for the communication between CNC controls and the remote computer. On activation of this software secured connection shall be established with remote computer. Remote computer shall be able to access all the CNC and PLC data including the PLC ladder. CNC parameters and data like axis and drive data shall be accessed and</p>

	<p>modified from the remote computer Status of inputs and outputs for PLC shall be accessed and faults if any shall be identified. Software related issues shall be corrected and hardware related issues like faulty limit switches, faulty proximity switches etc. shall be advised to site engineer or technician for correction over phone. Complete CNC screens shall be visible on the remote computer. Software shall be corrected in situ or corrected software shall be uploaded from the remote computer. This shall enables quick and specialized services employing experts from the manufacturers headquarter for the quick resolution of software and hardware related issues on the machines</p>
1.2.19.3	<p>PREDICTIVE MAINTENANCE:</p> <p>1. CNC controls of machine shall be equipped with predictive maintenance software to generate and log the alarms on machine controls as well as on manufacturer's server / cloud. These alarms shall be directly Communicated to two email ids assigned by consignee and one or two email ids of supplier. CNC controls shall be equipped with necessary software and hardware for connecting to internet. Consignee shall provide continuous High-speed internet connection using Ethernet (LAN) cabled connection or 3G / 4G wireless plug and play telephony (dongle). Caution alarm is generated sufficiently in advance before final failure alarm. Machine shall continue to work during caution alarm, which shall be repeated every eight hours till the time corrective action is taken or till the time failure alarm is generated. Caution and failure alarms must be provided for the following minimum conditions:</p> <ol style="list-style-type: none"> 1.1 Hydraulic oil low level. 1.2 Hydraulic oil high temperature. 1.3 Hydraulic oil filter clogging. 1.4 Condition of hydraulic pump by monitoring its leakage rate. 1.5 Rollers drive motor current 1.6 CNC Axes motor current. 1.7 Calibration of the machine. 1.8 Vibrations on tool slides. 1.9 Monitoring the working of electrostatic filtration unit. 1.10 Monitoring the working of hydraulic oil chiller unit. 1.11 Drive roller pressure is continuously monitored. 1.12 Battery of CNC system. 1.13 Battery of UPS for CNC system. 1.14 Temperature inside the control panel is continuously monitored. <p>The hardware and software arrangement for the above shall be explained in the bid.</p> <ol style="list-style-type: none"> 2. In addition to above, an instantaneous email shall be provided in case of an emergency alarms, like hitting of CNC axes hard limit switches, headstock over travel limit switches etc. 3. Separate CNC screen/window to measure individual and cumulative energy consumption of each servo and spindle motor should be available to know regeneration energy and power saving. 4. CNC must give information about the failure of FANs, Servo Motors & Drives with dedicated screens to check online health of FANs, Servo Motors & Drives. 5. CNC should have facility to measure the life of the consumables in the separate screen like filters, batteries etc. and alarm should be displayed once the life is over.
1.2.20	Operation of Tandem Under Floor Wheel Lathe (as per clause 4.3.6 of Section IV)
1.2.20.1	The tenderer/manufacturer shall quote for comprehensive operation of the Tandem

	Under floor Wheel Lathe on single shift per day basis at the rated capacity for a period five years from the date of commissioning of machine. Railway reserve the right to enter into operation contract for a period of one year or two year or three years or may not to enter into the operation contract for a particular machine.		
1.2.20.2	The price breakup element wise as attachment of the price schedule, are to be quoted the format is given below.		
	Format for Operation Charges in single shift at rated output including manpower, supervision and with all consumables and Tools (fig in Rs)		
	The charges shall be quoted year-wise for 5 years of Operation commencing from date of commissioning of individual machine.		
	Please quote Operation charges for 5 years (in figures & words)		
	Year of commencement of Operation agreement	Cost of Operation (In figures)	Cost of Operation (In words)
	Upto 1st year		
	From 1st year upto 2nd year		
	From 2nd year upto 3rd year		
	From 3rd year upto 4th year		
	From 4th year upto 5th year		
	NOTE: The year wise cost of Operation quoted is all inclusive price excluding applicable taxes. Taxes will be paid extra at actual.		
1.2.20.3	The Agreement for operation contract of CNC Tandem Under-floor Wheel Lathe is done separately for that machine as per the clauses mentioned below: a) The operation period will commence from the date of issue of LOA by Railway and the contractor is bound to enter into the M&P operation agreement at the quoted rates as per below table. However, Railways reserve the right not to enter into the operation contract for a particular machine. b) The detailed terms and conditions of operation contract shall be given by the bidder in the technical bid. c) Rates for operation agreement shall not be subject to any variation except for any statutory changes in taxes and duties. d) Performance bank guarantee is to be submitted in the prescribed format and document of the railways equal to the 1/4 th value of operation cost for each machine separately.		
1.2.20.4	The Contractor shall ensure operation of the machine, employing sufficient number of suitably trained skilled and unskilled manpower, ensuring quality and productivity parameters, during the period of operation.		
1.2.20.5	The Contractor shall make available all the consumables except those being provided by		

	Railways at free of cost for operation of the M&Ps. Railway will provide utilities like compressed air, natural water and electricity free of cost for operation.				
1.2.20.6	Criteria of acceptance: For satisfactory performance and for payment of operation charges, the contractor should produce the finished products as per rated output every quarter, of acceptable quality certified as per Para 1.2.20.15 below:				
1.2.20.7	<p>Rated output: As per the productivity of the machine to the committed cycle time, as called for in the technical specification.</p> <ul style="list-style-type: none"> 75 Rolling stock per quarter considering 25 working days in a month. 				
1.2.20.8	Each finished product from machine is accounted for rated output only upon certification for compliance to the quality parameters as per the respective drawings.				
1.2.20.9	Periodical quality checks as per existing norms (for determining the quality of the components produced on these machines) is carried by the Railways.				
1.2.20.10	In case of defective components produced on these machines, the same have to be rectified free of cost by the contractor duly ensuring no loss to the rated output of the machines.				
1.2.20.11	Contractor may require operating the machines on holidays/ Sundays also; for meeting the quarterly production target if machine remains under breakdown or non-availability of manpower on working days.				
1.2.20.12	Contractor shall not be eligible any extra payment if the quarterly output is increased by 10% of the rated output (rounded off to nearest whole number). Beyond 10 % increase in output in a quarter, additional payments shall be made as given below: $\text{Additional Payment} = \left\{ \frac{\text{Additional Output}}{\text{Rated output for the quarter}} \right\} \times \text{Quarterly payment}$				
1.2.20.13	If Railway fails to provide minimum guaranteed quarterly load (Raw material input in good condition for the rated output, compressed air, natural water and electricity) then also the contractor would be paid as per the terms and condition of the operation contract agreement, i.e., the contractor would be paid fully for rated output for the quarter.				
1.2.20.14	Payment: Normally quarterly payment is made to the contractor within 30 days from the end of that quarter subject to submission of the Certificate for the satisfactory performance, on submission of bills.				
1.2.20.15	Certificate for the satisfactory production as per rated capacity of the machine, is certified by concerned unit incharge based on the report of the concerned SSEs in-charge of Production.				
1.2.20.16	<p>Penalty Clause: Failure to ensure the rated output will result in the following penalty. Penalty shall be calculated as percentage of quarterly payment and will be deducted from the respective quarterly payment. Penalty calculation will be done as per details given below:</p> <table border="1" data-bbox="343 1691 1401 1892"> <thead> <tr> <th>S.NO</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Reduction in rated quantity of output on proportionate basis, calculated as follows: Quarterly Outturn required:- 75 Rolling Stock $\text{Penalty} = \left\{ \frac{\text{Rated Output} - \text{Actual Outturn}}{\text{Rated Output}} \right\} \times \text{Quarterly payment}$ </td> </tr> </tbody> </table>	S.NO	Description	1	Reduction in rated quantity of output on proportionate basis, calculated as follows: Quarterly Outturn required:- 75 Rolling Stock $\text{Penalty} = \left\{ \frac{\text{Rated Output} - \text{Actual Outturn}}{\text{Rated Output}} \right\} \times \text{Quarterly payment}$
S.NO	Description				
1	Reduction in rated quantity of output on proportionate basis, calculated as follows: Quarterly Outturn required:- 75 Rolling Stock $\text{Penalty} = \left\{ \frac{\text{Rated Output} - \text{Actual Outturn}}{\text{Rated Output}} \right\} \times \text{Quarterly payment}$				

		Rated output for that quarter	as per the contract
1.2.20.17	The operation contract agreement for each machine is done separately on mutually agreed terms and conditions as offered by bidder and accepted by Railway.		
1.2.20.18	The operation charges attached in financial bid will not be considered for evaluation of offer being optional.		
1.2.20.19	The contractor should engage only those persons who have been medically examined by the Medical Practitioner having minimum MBBS degree and their character should also have been duly verified by the Police/ Gazetted Officer/ Notary/ Sarpanch/ Village Pradhan. However, in case of Govt./ Public Sector agency engaging staff, such certificate/ character verification is exempted. The contractor shall submit the medical fitness and character certificates of his employees to the consignee gazetted officer, before taking up the job inside the complex at the beginning of the work as well as between as and when any of his employee is replaced with new employee.		
1.2.20.19.1	The contractor shall submit the BIO-DATA (name, Father's name, Address, Age, size photo & employee no. etc.) of his employees duly attested by the contractor to the consignee gazetted officer, before taking up the job inside the complex at the beginning of the work as well as in between as and when any of his employee is replaced with new employee.		
1.2.20.20	Issue of Entry Permit: Contractor should issue Identity badges (as per approved format by consignee gazetted officer) to all his labour being engaged to carry out the Work, including the Supervisor. These identity badges should be so carried that Railway Security can identify them.		
1.2.20.21	<p>Legal obligations of the successful bidder:</p> <p>The contractor shall be responsible for carrying out all legal obligations under this contract. The contractor shall adhere to the provisions of various acts as under:</p> <ul style="list-style-type: none"> • Minimum Wages Act, 1948 (para 54 of Indian Railways Standard General Conditions of Contract) • Payment of Wages Act 1936 (para 55 of IRGCC) • Contractor Labour (Regulation and Abolition Act) (para 55 A of IRGCC) • The workmen's Compensation Act. (para 57 A of IRGCC) • Factories Act, 1948. • The contractor shall also fulfil any other required legal obligations as part of this contract. 		
2.0	GENERAL ELECTRIC SPECIFICATION		
2.1	The provision of this General Specification shall apply, where ever relevant.		
2.2	All equipments and material shall comply with appropriate Indian Standards (latest), International Standards or National Standards of the country of origin provided the latter are equivalent to or better than the former. The tenderer shall indicate the Standards applicable. The following standards are applicable in particular. (Corresponding International Standards like ASA, NEMA, BIS, DIN etc. may also be quoted).		
IS:	12615:2018(latest)	-	Energy Efficient Induction Motors — Three Phase Squirrel Cage (corresponding to IEC 60034-30 : 2008) (Latest).

IS:	1248 (Latest)	-	Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest).
IS:	1231-1974 (Latest)	-	Dimensions of three phase induction motors (corresponding to IEC Pub-72-1) (Latest)
IS:	1271-1985 (Latest)	-	Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub-85) (Latest)
IS:	IS: 13947:2004 (Latest)	-	Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).
IS:	IS: 11353:2017 (Latest)	-	Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring.
IS:	996-1979 (Latest)	-	Single phase small AC and universal electrical motors.
IS:	1356 (Latest)	-	Electrical equipment of machine tools.
IS:	IS/IEC 60947 : Part 2 : 2016 (Latest)	-	Circuit breakers (corresponding to IEC Pub-56) (Latest)
2.3	Unless specified in the main specification, the AC motors and starters shall be of the following type. Tenderer is, however, free to give alternative proposal along with justification, if in his view alternative proposal is warranted by site conditions. Type of motor type of starter.		
	TYPE OF MOTOR		TYPE OF STARTER
2.3.1	Any type of AC motor starting current of which does not exceed 75 amps.		Direct on line / VVVF drive.
2.3.2	AC squirrel cage, induction motors, starting current of which is above 75 amps. if started direct on line.		Star delta or Auto transformer type or VVVF drive.
2.3.3	AC slipring type motor.		Resistance type air/fan Cooled
2.3.4	AC synchronous or synchronous induction motor.		Suitable makers standard.
2.3.5	DC motor		Resistance type/Thyristor type.
2.4	The control gear for AC/DC motors shall incorporate the following protection devices as concomitant accessories.		
2.4.1	No Voltage Protection - No voltage protection shall be provided so that machine will not start up again by itself when, following an interruption the supply is restored.		
2.4.2	Short Circuit Protection - To protect against short circuits due to insulation failure of faulty connections HRC fuses/MPCB's shall be provided for each motor. The rating of the fuse/MPCB's shall be such as to take care of the over current due to motor starting.		
2.4.3	Over Load Protection - To prevent motors from overloading, overload protection shall be provided separately for each motor. Three phase motors shall be protected by overload tripping devices on each phase.		
2.4.4	Single Phasing Protection – On load single phasing protection shall be provided using MPCB as detailed above.		
2.5	Control equipment shall be mounted in separate drip proof enclosures. Control enclosures and compartments are to be so designed as to give adequate protection against ingress of dust, oil, coolant or chips. All control devices like contractors etc. shall be front mounted on a rigidly fabricated metal panel for ease of operation. All other electrics shall be installed that they are readily accessible when the doors and covers are opened. Hinged covers shall be interlocked with the machine tool control to prevent operation of the machine when cover is open.		

2.6	The motor shall be totally enclosed with or without fan cooled frame. Screen protected drip proof type motor may be provided if it is mounted inside protective enclosures.		
2.7	The electrical equipments shall comply with the requirement of Indian Electricity Act and Rules (latest).		
2.8	All instruments shall be of the Industrial Grade "A" (IS-1248) switch board type the range of the instrument shall be such that the maximum load expected in the circuit shall produce a deflection of 60% to 80% of the full scale.		
2.9	The supplier shall furnish 3 sets of complete electrical and electronic wiring diagrams in full details to enable the maintenance staff to locate faults in the circuits, 3 sets of part catalogues, maintenance manuals operating instructions with details of coils and windings, used in the equipment to facilitate repairs and maintenance should also be supplied.		
2.10	For main motor class minimum "F" Class insulation or better shall be provided. If any other class of insulation is proposed, detailed justification for providing different class of insulation shall be given.		
2.11	Motors shall be designed to withstand frequent starts, stops and reversals as demanded in the operation of the machine.		
2.12	Two earthing terminals shall be provided on all electric motors including the control gear.		
2.13	POWER SUPPLY		
2.13.1	The machine shall be suitable for operation on 415 volts 3 phase 50 cycles AC 3 wire or 4 wire system with neutral solidly earthed. The supply voltage may vary up to +10% - 20%. The frequency may vary up to + 3%. However, full rated power of the motor shall be available at the lower voltage. Firm should confirm satisfactory performance of the machine at incoming power supply in the range 415V+10%-20% and 50HZ+3% frequency or should provide voltage stabilizer as specified against clause 2.13.2 below of required capacity.		
2.13.2	The voltage stabilizer, if required, shall conform to :		
2.13.2.1	Input Voltage	-	320 to 460 volts 3 phase 4 wire supply.
2.13.2.2	Out put Voltage	-	415 volts
2.13.2.3	Regulation	-	± 1% from No load to Full load.
2.13.2.4	Rate of correction	-	20 volts per second per phase.
2.13.2.5	Wave from distortion	-	NIL
2.13.2.6	Efficiency	-	Not less than 97%.
2.13.2.7	Winding and class of insulation	-	Copper wire wound with "B" class of insulation or better.
2.13.3	In case of machines equipped with NC, SS, CNC, Thyristor controlled devices and other sophisticated electronic gadgets including microprocessors etc. which are susceptible to power line spikes and surges, a suitable voltage stabilizer and ultra isolation transformer of adequate capacity to cover for the entire electrical load of the machine shall be offered as a concomitant accessory conforming to Specification for voltage stabilizer as mentioned in clause 2.13.2 above and isolation transformer to the parameters mentioned below.		
2.13.3.1	Transformer ratio	-	1:1
2.13.3.2	Winding	-	Copper wire wound with "F" class insulation or better.
2.13.3.3	Protection	-	To arrest spikes and surges to the order of

			3 KV for 200-400 micro seconds duration.
2.13.3.4	Common mode rejection ratio	-	120 dB
2.13.3.5	Isolation	-	Capacitance 005 Pf: resistance greater than 1000 Mega Ohms.
2.13.4	Voltage stabilizer shall be equipped with a protective relay to trip the AC power supply to the machine instantaneously with audio and visual indication to the operator. Settings of the protective relay for low and high voltage shall be 320 volts and 460 volts respectively.		
2.14	ATMOSPHERIC CONDITIONS		
2.14.1	The ambient temperature at the site at which the machine is installed may vary from -4°C to +50°C over the year. The relative humidity may be as high as 98%. The atmosphere is expected to be dusty. The machines offered shall be suitably tropicalised to work under these atmospheric conditions without any adverse effect on their performance.		
2.15	The temperature rise shall not reach such a value that there is a risk of injury to any insulating material or adjacent parts.		
2.16	The drive shall be capable of operating at any one of the speed required independent of the load in accordance with the requirements of the machine.		
2.17	Information/data shall be furnished as per the format of submission of technical bid Annexure–A of Section - VI.		
3.0	GENERAL CHARACTERISTIC:		
3.1	RIGIDITY AND STABILITY		
3.1.1	The machine shall be robust, rigid and of sturdy construction. It shall be designed to meet heavy duty demands of various operations on the machine under normal Workshop environment for such machines. It shall be free for vibrations even when working at full capacity.		
3.1.2	All machine castings shall be made of close grained high grade cast iron like Meehanite or equivalent materials meeting IS-210 Standards to ensure durability and rigidity. The casting shall be thermal stress relieved to ensure stability and continued accuracy.		
3.1.3	All machine fabrications of critical load bearing assemblies shall be adequately strengthened and stress relieved.		
3.1.4	Change in ambient temperature shall not affect the performance of the machine.		
3.1.5	There shall be no change in the performance of the machine either on switching on the machine or after continuous running.		
3.1.6	There shall be no resonant vibrations throughout the working range of the machine at all load levels.		
3.2	SAFETY CONTROLS		
3.2.1	The machine shall incorporate safety devices to provide protection to the operator and machine against all possible operational and machinery failures.		
3.2.2	Suitable interlock shall be provided to prevent machine operations in the event of:		
3.2.2.1	Faulty sequence of operation.		
3.2.2.2	Fluctuation in supply voltage.		
3.2.2.3	Resumption of power supply after power failure.		
3.2.2.4	Non-positioning of safety guards.		
3.2.2.5	Failure of hydraulic system (where applicable)		
3.2.2.6	Failure of lubricating system (In case of automatic including drop in pressure lubrication)		
3.2.3	A fault or damage in the control circuit or interruption re-establishment after an		

	interruption of fluctuation in whatever manner in the power supply to the machinery must not lead to dangerous situations in particular.
3.2.3.1	The machinery must not start unexpectedly.
3.2.3.2	The machinery must not be prevented from stopping if command has already been given.
3.2.3.3	No moving part of the machinery or piece held by the machinery shall fall or be ejected.
3.2.3.4	The protection devices must remain effective.
3.2.4	The machine shall be fitted with an emergency stop device to enable actual or impending danger to be averted. This device must be:-
3.2.4.1	Conveniently located.
3.2.4.2	Clearly identifiable.
3.2.4.3	Stop the machine as quickly as possible without causing additional hazards.
3.2.4.4	The emergency stop must remain engaged. It should be possible to disengage it only by appropriate operation. Disengaging the control must not restart the machinery but only permit restarting.
3.2.5	Safety features shall also include:-
3.2.5.1	Safety device against overload for all mechanical and electric items to the extent possible.
3.2.5.2	Safety stops against over-running of slides.
3.2.6	Guard and protection devices shall protect exposed persons against risks related to moving transmission parts (such as pulleys, belts, gears, rack and pinion, shafts etc.) and moving parts directly involved in the process to the extent possible. This shall meet the following requirements:-
3.2.6.1	Be of robust construction
3.2.6.2	Not give rise to any additional risk
3.2.6.3	Not be easy to by pass or render non-operational
3.2.6.4	Be located at an adequate distance from danger zone
3.2.6.5	Cause minimum obstruction to the view of the production process.
3.2.6.6	Rigidly connected and not prone to rattling
3.2.6.7	Enable essential work to be carried out without the guard or protection device having to be dismantled.
3.2.7	A load meter shall be provided to indicate the electrical load on the machine. The meter shall have a suitable mark to indicate the maximum load the machine can take.
3.3	OPERATIONAL CONTROLS
3.3.1	The operation of the machine shall be by push buttons, soft keys or levers. The basic rules for the direction of operation of controls and the corresponding direction of movements of the machine tools shall be as per IS:2987-1985 for operating levers.
3.3.2	The control devices shall be
3.3.2.1	Clearly visible and identifiable.
3.3.2.2	Ergonomically positioned for safe operation without hesitating or loss of time, and without ambiguity.
3.4	LIGHTING
3.4.1	Integral lighting suitable for the operations concerned where its lack is likely to cause a risk despite ambient lighting of normal intensity shall be provided.
3.4.2	The manufacturer must ensure that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects due to lighting provided by the manufacturer.
3.4.3	Integral parts requiring frequent inspection and adjustment and maintenance areas must be provided with appropriate lighting.

3.4.4	The machine lighting should be of low voltage so as to prevent any hazard to the operator.
3.5	MACHINE MAINTAINABILITY
3.5.1	The machine shall be so designed as to require minimum possible maintenance and to give trouble free service.
3.5.2	All assemblies/parts of the machine shall be easily accessible for maintenance.
3.5.3	The machine shall not require major dis-assembly for checking and replacement of a particular part, especially for parts requiring periodical check up and replacement.
3.5.4	The manufacturer must provide means of access e.g. stairs, ladders, cat walks etc. to allow access safety to all areas used for production, adjustments and maintenance operations.
3.6	WEAR COMPENSATION ADJUSTMENT
3.6.1	The original built in accuracy of the machine shall be capable of being maintained conveniently and economically by suitable adjustments for taking up wear on slides, bearings and load screws. The system of adjustments incorporated shall be explained in the offer.
3.7	COOLANT SYSTEM (WHERE APPLICABLE)
3.7.1	Suitable coolant system with pump, motor, tank, filter etc. shall be provided. The coolant pump shall be as per IS: 2161-1962. The filter shall be of reusable type and indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare. Details of the coolant system shall be indicated in the offer.
3.7.2	The supply of coolant shall be in ample volume. Provision to re-circulate the coolant shall be available. A chip and coolant tray shall be provided. The volume of coolant flow shall be indicated. It shall be adjustable.
3.7.3	An enclosure shall be provided to prevent the coolant from splashing outside the machining zone. Details of enclosure shall be provided. Specific requirements of coolant system for grinding machines etc. shall be clearly indicated.
3.8	LUBRICATION SYSTEM (WHERE APPLICABLE)
3.8.1	The machine shall be provided with an automatic lubricating system for ensuring delivery of adequate quantity of lubricant to areas requiring continuous lubrication. Suitable arrangements must be provided for indication of failure of the lubricating system.
3.8.2	The system shall be provided with interlock to prevent machine operating/starting in the event of the failure lubrication system.
3.8.3	Reusable filters capable of filtering chips, dust particles etc. shall be provided. Indicators for showing clogged condition of filters shall be available. The filters shall be indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
3.8.4	Lubrication and filter cleaning chart shall be displayed on a metal plate at a conspicuous location on the machine indicating: -
3.8.4.1	Specific location of points on the machine to be oiled lubricated/greased.
3.8.4.2	Periodicity of lubrication of these points.
3.8.4.3	Filter to be cleaned.
3.8.4.4	Periodicity of cleaning filters.
3.8.4.5	Periodicity of replenishing lubricating oil for the centralized system.

3.8.4.6	Any other similar relevant information.
3.8.5	Points where manual lubrication is needed shall be separately indicated. Frequency of lubrication shall be also clearly mentioned.
3.8.6	Lubricating oils used in the machine shall be available in India. Successful tenderer is required to indicate brand names of approved oils manufactured by various Indian Oil Companies.
3.8.7	First fill of lubricating oils used in the machine shall be provided with the machine. Details of lubricating system provided shall be indicated.
3.9	PNEUMATIC SYSTEM (WHERE APPLICABLE)
3.9.1	The compressed air supply is provided by the customer at the machine within pressure range of 4.5-7.5 kg/cm ² and a moisture content or 1000 ppm. The pneumatic system of the machine should be designed accordingly. An alarm shall be provided for low air pressure.
3.9.2	Suitable filter/moisture trap shall be provided by the contractor in the system of pneumatic air intake. The filter shall be reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be easily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
3.9.3	Air pressure regulator, if necessary, shall be provided by the tenderer.
3.9.4	The make of pneumatic control equipment shall be of reputed make. The makes shall be indicated.
3.10	HYDRAULIC SYSTEM (WHERE APPLICABLE)
3.10.1	Hydraulic circuit must be equipped with the following safety and inspection equipments:
3.10.1.1	Pressure gauges at all place, where pressure has to be set up or inspected.
3.10.1.2	Safety valves for hydraulic circuit if relief valve does not fulfill this function.
3.10.1.3	Equipment for checking of temperature in the circuit or in the pump wherever necessary.
3.10.1.4	Arrangement to show if the filters (including those in the pump set) are choked and need cleaning. The filters shall be of reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
3.10.1.5	Alarm for low oil level.
3.10.2	The sump aggregate shall have the following:
3.10.2.1	Oil level sight gauges or any other equipment showing the minimum and maximum oil levels in sump.
3.10.2.2	A drain plug at the lowest portion of the tank.
3.10.2.3	It shall be possible to drain the oil from the tank without disconnecting any pipes or other fittings.
3.10.3	The temperature of oil in hydraulic circuits shall not exceed 60 degrees C in any case. Suitable arrangement shall be incorporated to ensure that the oil is not overheated under local weather conditions at continuous normal working of the machine.
3.10.4	Facilities for bleeding of air in case of air lock shall be provided.
3.10.5	The hydraulic reservoir, pump and allied equipment shall be suitably segregated from the machine in order to remove major source of heat.
3.10.6	Hydraulic oils used on the machine shall be available in India. Successful tenderer is required to indicate brand names of approved oils supplied by various Indian Oil Companies.

3.10.7	First fill of hydraulic oils used on the machine shall be provided with the machine.
4.0	TECHNICAL LITERATURE:
4.1	One copy of the printed illustrative catalogue showing features of the machine and its elements must be enclosed with each copy of the bid.
4.2	The technical literature shall be provided for the complete machine, including imported and indigenously purchased components / sub- assemblies. The successful tenderer will have to furnish 4 (four) copies each of the following manuals directly to the consignee along with the machine. Out of these 04 sets, the bidder shall be required to submit one set of all documents in best available condition one month prior to the training for the machine. One set of technical literature should cover the following details
4.2.1	Operational & Maintenance manual of the machine.
4.2.2	Operational & Maintenance manual of the servo controlled voltage stabilizer.
4.2.3	Operational & Maintenance manual of the ultra-isolation transformer.
4.2.4	Instruction & Maintenance manual for Hydraulic Oil Cooling Unit.
4.2.5	User manual for Tool changer system (if provided).
4.2.6	Technical & Maintenance manual for Hydraulic System
4.2.7	Technical & Maintenance manual for Lubrication System.
4.2.8	Operator Guide for CNC Control System (if provided in softcopy).
4.2.9	Programming Guide for CNC Control System (if provided in soft copy).
4.2.10	Diagnostic & Trouble shooting Guide for CNC Control System (if provided in soft copy).
4.2.11	Start-up Guide for CNC Control System (if provided in soft copy).
4.2.12	Machine Software Listing (if provided in soft copy).
4.2.13	Soft and hard copies of PLC Program in ladder form with cross reference listing and PLC project file in soft copy .
4.2.14	Drawings of tooling & fixtures, hard copies in A-3 size as well as soft copy in PDF format.
4.2.15	Wiring diagram/circuit diagram, in which length of wires must be mentioned, hard copies in A-4 size as well as soft copy in PDF format in soft copy .
4.2.16	Mechanical drawings (roller assembly, tool slide assembly, hold down assembly), hard copies in A-2/3 size as well as soft copy in PDF format.
4.2.17	Spare part manual including part lists no., hard copies in A-4 size as well as in PDF format
4.2.18	Lay out drawings in A-2 size, which clearly shows the position of all type of electrical components in machine.
	Note: 1.All manual and literature should be in English/Hindi.
	2. In addition, a hard copy of technical literatures of the items in clause 4.2.8,4.2.9,4.2.10,4.2.11,4.2.12,4.12.13 shall also be provided in digital form to the consignees as an effective aid to their working.
5.0	SPARES:
5.1	Since the machine is under comprehensive preventive maintenance during warranty period of two (02) years and under CAMC for five (05) years after the warranty period, it is the sole responsibility of bidders to stock such spares as required for smoother execution of PMC during warranty and CAMC in order to achieve response time in compliance to machine availability as per stipulated requirements.
6.0	CONSUMABLES:
6.1	The list of consumable spares shall be furnished and quoted along with their unit rates.
6.2	Consumables shall be supplied along with the machine or as per agreed time table, if

	ordered.										
7.0	SPECIAL FEATURES:										
7.1	Special features incorporated in the machine, if any, shall be indicated separately in the bid clearly indicating the advantages.										
8.0	DEVIATIONS:										
8.1	The tenderer shall certify that the offered machine fully meets the specification. Various design features incorporated in the machine to fulfill different technical performance requirements shall be fully explained in the offer. However, minor deviations from these specifications which do not affect or in any way interfere with the stipulated performance standards or would result in improved safety/ reliability or would reduce recurring maintenance/operating cost of the machine, can be considered for acceptance. The tenderer in such eventuality shall clearly indicate the details of these deviations and their implications as per the following format:										
8.2	All Deviations shall be clearly indicated in the deviation statement as per the format of submission of technical bid Annexure–A of section-VI.										
9.0	INSPECTION AND TESTING AT MANUFACTURER’S WORKS:										
9.1	The machine shall be inspected and tested during different stages of its manufacture starting from raw material till the completion of machine, by the purchaser or his authorized representative at the supplier’s or his sub-supplier’s works. The Quality Assurance Programme as per Annexure-G shall be submitted along with the bid. The bidder must submit the exhaustive QAP incorporating the tests as given in Annexure-G along with other tests /stage inspection as followed by them.										
9.2	A load and functional test like no load test and cycle time prove out test as per clause 2.5.1 of schedule IV must be carried out at the manufacturer’s works. Rigidity of the machine shall be demonstrated to the satisfaction of appointed inspector or inspecting agency.										
9.3	Manufacturers must have suitable facilities at their works for carrying out various performance tests on the sub-assembly/assembly/machine. The tenderer shall clearly confirm that all facilities exist and shall be made available to the inspecting authority.										
9.4	A Sample Inspection Chart for inspecting the equipment shall be supplied along with the bid. The inspection chart should indicate all the tests that are carried out during the machine manufacture and also the tests to be offered to inspecting agency. The standard to which this inspection chart conforms should be clearly indicated. Against each test, acceptable limit/ range of values shall be indicated.										
9.5	Two Stage Inspection (Excluding Final Lot inspection)shall be as below :										
	<table border="1"> <thead> <tr> <th>S N</th> <th>Stage</th> <th>Category</th> <th>Sample size</th> <th>Reference</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1ST Stage Raw Materials Bought Out Components, Bought out sub assemblies, Hardness of components</td> <td> <ul style="list-style-type: none"> • Steels • Bearings • Electric Motors • Hydraulic Pumps&Elements • Rubber Seals, O Rings &Seals • Controllers • Ball Screw • Weld joints, Load Bearings &Others • Machine Bed </td> <td>100 %</td> <td>As per Quality Assurance Plan of section VI</td> </tr> </tbody> </table>	S N	Stage	Category	Sample size	Reference	1	1 ST Stage Raw Materials Bought Out Components, Bought out sub assemblies, Hardness of components	<ul style="list-style-type: none"> • Steels • Bearings • Electric Motors • Hydraulic Pumps&Elements • Rubber Seals, O Rings &Seals • Controllers • Ball Screw • Weld joints, Load Bearings &Others • Machine Bed 	100 %	As per Quality Assurance Plan of section VI
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			<ul style="list-style-type: none"> • Gears • Couplers • Hydraulic components 		
	2	2 ND Stage In Process	<ul style="list-style-type: none"> • Heat Treatment • Castings • Spindles • Surface finish of components • Noise level • Temperature rise • Structures Geometry alignment, Guideways 	100 %	
10.0	TRAINING:				
10.1	Training by the firm shall be imparted in operation and maintenance of the machine. The training to be imparted shall cover operation, troubleshooting and repair of all mechanical, hydraulic, electrical & electronics equipments (AC Drives) and PLC part programming. This training shall be provided to 06 persons per consignee nominated by the consignee for a period of two weeks at the manufacturer's premises. All charges pertaining to travel, boarding and lodging shall be borne by Indian Railways. The bidder shall quote the cost of training per person.				
10.2	Subsequently, technical experts from the manufacturer will fully and adequately provide training to operators and maintenance staff nominated by the consignee at the time of commissioning of the machine.				
10.3	The supplier is responsible for co-coordinating with the consignee the travel plans of trainees to ensure that the training is imparted on the machine at its assembly and testing stage. The bidder shall also submit training schedule along with the offer.				
	Note: All training should be imparted in English/Hindi only.				
11.0	FOUNDATION & RELATED DRAWINGS				
11.1	SUBMISSION OF GA, FOUNDATION & RELATED DRAWINGS FOR APPROVAL:				
11.1.1	For each machine, the supplier shall first submit 04 copies of GA drawings with complete layout of machine elements, hydraulic tank, electrical panel, Servo Controlled Voltage Stabilizer etc. along with machine weight, overall dimensions, electrical load for approval as per time schedule specified in Section-IV to each consignee for approval and to enable the consignee for making necessary arrangements for Installation & Commissioning of Machine on receipt.				
11.2	APPROVAL OF GA, FOUNDATION & RELATED DRAWINGS:				
	To be governed by Time Schedule in clause 7.0 of section-IV and following stipulations.				
11.2.1	General Arrangement Drawings is sent by the 'Contractor' to the Consignee as per Time Schedule annexed in LOA/Contract. Consignee will take necessary action for approval of GA drawings. The 'Contractor' should ensure that drawings sent to consignee are complete in all respects as specified in technical specification. The GA drawings shall be approved by the consignee and given back to the contractor under advice to PCME/Central Railway as per the Time Schedule in the LOA/Contract.				
11.2.2	Delays in submission of drawings by Contractor is added to the delay in supply of				

	machine in case submission of GA drawing is delayed beyond stipulated time as per time schedule and LD is levied. Thus the number of days delay in submission of GA drawing plus the number of days delay in supply of machine together is taken as the delay in supply of machine. However if the contractor supply the machine before original delivery period as per AT the number of days by which machine has been supplied earlier than original delivery period that many days is subtracted from the delay in submission of GA drawings and LD is levied accordingly. Delays in approval of the drawings by consignee will not be on account of Contractor, except as detailed below(CI no.11.2.3, 11.2.4, 11.2.5, 11.2.6 & 11.2.7)
11.2.3	In case Consignee finds some deficiencies in the Drawings and returns the same for rectification to the 'Contractor', the contractor must return the rectified drawings within 30 days from the date of issue of letter by Consignee. This period will not be counted towards LD calculation. The consignee shall ensure that all deficiencies in the Drawings shall be pointed for clarification to the firm together at one time only instead of piecemeal multiple reference.
11.2.4	A repeat back reference(s) by Consignee to Contractor pointing out further defects/deficiencies in the Drawings, is considered a delay on account of the contractor, except for special circumstances like change in location, review of arrangement etc. Thus, Contractors must take utmost care in ensuring completeness as per requirements of the Consignee.
11.2.5	Where GA Drawing cannot be approved by consignee due to clear site not being available etc., the Consignee must inform Contractor and PCME CENTRAL RAILWAY, explaining the exact delay. However, initiative must be taken by Contractor to obtain such a certificate from Consignee. Contractor must bring any difficulty/dispute to the notice of headquarter immediately.
11.2.6	In their own interest, contractor must maintain a log of events in this respect with clear dates and regularly inform consignee and PCME CENTRAL RAILWAY, to avoid wrong levy of LD. Consignees must cooperate with Contractors by providing all assistance, including clear information about any expected delays in site availability, promptly and in writing.
11.2.7	If an order has been placed on the firm, the firm will have to advise the consignee well in advance regarding requirement of road permit and assistance required from the consignee, if any, so that delay on this account is avoided. Firm should also visit the site before dispatch of machine to assess the condition of path to be used for movement of trailer.
11.3	DISPATCH OF THE MACHINE FROM MANUFACTURER WORKS:
11.3.1	In case of delay on part of consignee in providing the clear site for construction of foundation or any other facility as specified in the contract to the supplier, the supplier will report the matter to Headquarter. In case of delay in readiness of site on part of consignee, PCME CENTRAL RAILWAY, shall take up the matter with concerned consignee, and advise supplier accordingly.
11.3.2	In case proving of component at manufacturer works, the supplier should request for the same as soon as possible after receiving contract keeping allowance of transit time etc. and approximately 60 days for consignee to handover the parts after receipt of the request accompanied by appropriate and valid bid guarantee. In the event of consignee certifying the non-availability of prove out components, such components is deemed to

	be proved out at manufacturer works. However the firm will prove out these components at consignee subject to the availability.
12.0	INSTALLATION, COMMISSIONING AND PROVING TESTS: (ON TURNKEY BASIS)
12.1	Joint Check – The contractor would be required to carry out a joint check at consignee’s end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint receipt inspection be done immediately on receipt of the machine by consignee & bidder’s representative to avoid commissioning delays due to shortages/transit damages. After receipt of the machine as above a Joint Receipt Inspection note (JRI) as per Annexure- B of Section- VI shall be prepared by the consignee and the firms representative indicating the tentative time schedule for various activities of installation and commissioning. For Indian manufacturers, JRI note shall accompany the bill for 80% payment.
12.2	RESPONSIBILITIES OF CONSIGNEE AND BIDDER
12.2.1	The consignee shall be responsible for-
12.2.1.1	Provision of a clear covered (except where shed is in the scope of contract) site for construction of foundation as per the schedule to ensure its readiness before arrival of machine at site.
12.2.1.2	Electricity, water and compressed air for installation and commissioning of machine shall be provided free of cost.
12.2.1.3	Whenever a road mobile crane has to be arranged by the supplier for material handling, a clear approach for it up to the site has to be provided.
12.2.1.4	Clear covered space for storage of material/equipment required for working/ construction of foundation and installation of the machine etc.
12.2.1.5	The consignee shall arrange the raw material for prove out at their end within 30days of the dry run of the machine (installation, power connection, auxiliary connection like air, water connection) failing which such components is deemed to have been proved out. The components supplied by the consignee in time is required to be proved out within 30 days thereafter.
12.2.2	The bidder shall be responsible for -
12.2.2.1	Design of foundation as well as flooring (if required) of sufficient thickness, suiting local soil conditions at the site.
12.2.2.2	Advise consignee in time regarding schedule for requirement of clear site for construction of foundation and other infrastructure, resources & facilities required.
12.2.2.3	Construction of foundation as well as flooring (if required) of sufficient thickness suiting local soil conditions, for machine shall be completed by the bidder at the site provided by the consignee before receipt of the machine at their premises.
12.2.2.4	Provision of all tools and equipment, technical and unskilled manpower, material handling accessories/ equipment and material for installation and commissioning.
12.2.2.5	Unloading of the machine on receipt (both imported and indigenous machine) and its movement to the site of installation including provision of road mobile crane.
12.2.2.6	The bidder should ensure the proper earthing for the machine and its peripherals/accessories.
12.3	Consignee will provide only 415 V+10%-20%, 3 phase 50 Hz+3% AC supply at a single point (mains). All types of cables, connections, circuit breakers, isolator switch etc. required for connecting power supply point to different parts of the machine/control cabinets, shall be the responsibility of the bidder. Requirement of grounding/earthing

	<p>with required material shall also be incorporated by the bidder during construction of foundation.</p> <p>Electrical work like laying of power/electrical cables & earthing wires from mains to machine control panel (upto 20 meters) as well as within the machine, with supply of all materials shall also be carried out by the supplier.</p>
12.4	<p>The supplier shall demonstrate machine performance and prove out the claimed capability for successful commissioning at the consignee's works as per clause 3 of Section-IV. The M&P shall be deemed to be "commissioned" at consignee premises on the date when it is tested and meets with the specified capabilities/functions according to the technical specifications. In addition to above, in case of tooled-up M&P, the M&P shall be deemed to be "Commissioned" at consignee premises on the date when "prove out" components specified as per the relevant clause of technical specification have been successfully proved out meeting the productivity requirements of Technical specification. The consignee shall arrange the raw material for prove out at their end within 30 days of dry run of the machine (installation, power connection, auxiliary connections like air, water etc.) failing which such components is deemed proved out. The components supplied by consignee in time is required to be proved out within 30 days thereafter. Any delay in providing the "raw material or any other input" for proving out shall not be logged on supplier's account.</p> <p>A Joint Commissioning Note (JCN) to this effect shall be made as per the format at Annexure-C of Section-VI. After issue of JCN the performance shall be watched for a period of one month, after which the PTC shall be issued. The issue of PTC can not be delayed by more than 60 days from the issue of JCN. If some minor breakdowns are noticed after the issue of JCN, these shall be attended as per warranty obligations and suitable extension of the warranty period, under intimation to PCMM and PCME Central Railway. If PTC is not issued till the expiry of 60 days from the issue of JCN, then the issue will be discussed in a meeting between consignee , supplier and PCME , Central Railway office. Based on this, decision to issue PTC is taken by PCME, Central Railway.</p>
12.5	<p>If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repair/replacement either before commissioning or during warranty, the manufacturer would be required to submit BG of suitable amount. In case the entire machine has to be taken back, a Bank Guarantee for the cost of the machine would have to be submitted. The bank guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the machine.</p>
13.0	SERVICE FACILITY IN INDIA AND TECHNICAL SUPPORT
13.1	<p>The tenderer will clearly spell out in the offer the facilities available with him for providing adequate after-sales service in India during warranty period in the appropriate section of Annexure 'A' of section VI . The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated. Bidders not offering complete servicing/repair facilities in India to ensure quick response to maintenance/ servicing calls are not likely to be considered.</p>
13.2	<p>After the warranty period and CAMC period, if any, the manufacturer shall agree to provide service supports for trouble shooting and obtaining spare parts. The manufacturer shall be obliged to provide spare parts required by the Purchasers for a period of 20 years from the date of delivery of the machine at the ultimate destination to</p>

	safeguard against obsolescence.
13.3	<p>The following information must be furnished by the Tenderer/ Manufacturer regarding facilities for after sale service available in India.</p> <p>(i) Whether similar types of machines have been sold earlier by the manufacturer through the agents in India, if so the machine model number and details of the customers to whom the machines were sold should be furnished.</p> <p>(ii) Whether any trained engineers are available in India either with the firm or with their agents to attend to after sale problems of;</p> <p>(a) Control equipment</p> <p>(b) Machine and</p> <p>(c) Location where these engineers are available in India.</p> <p>(iii) If reply to (ii) above is in negative, the nature of after sale service proposed to be provided by the manufacturer during the warranty period and later. The number of service engineers and their location may also be specified;</p> <p>(iv) What inventory of spare parts for the control equipment and the machine will be maintained by the manufactures directly or with their agents in India for the warranty period requirement. The location of proposed warehouse for maintaining the inventory and the approximate value of such inventory may also please be indicated, along with the list of such spares.</p> <p>(v) Whether repairable parts assemblies like printed circuit boards will be repaired in India or sent to the manufacturer aboard during the warranty period and the modalities for the same.</p>
13.4	The machine shall at all times give contractual out-put and accuracy. Any deficiency or break down for a total of 02 hr. or more for a day would be treated as failure for the day, for the purpose of extending warranty period in terms of clause 16.2 above.
13.5	The tenderer shall ensure that incase a failure is reported by a consignee qualified service engineers shall visit the site within two days from the date of complaint on calendar day's basis. The period of three days (excluding date of complaint) after the failure reported shall be treated as grace period, which will not count towards breakdown time for up to one failure per month and a maximum of 3 failures per quarter. In case the number of failure exceeds one failure per month or three during any quarter of warranty, grace period of only 1 day will be permissible for such additional failure. Complaints shall be lodged by consignee by phone, e-mail or per bearer at address given by the tenderer.
13.6	The details of preventive maintenance to be provided during warranty period shall be indicated by the tenderer giving details of type of preventive schedule, periodicity on items to be checked, items to be replaced and expected plant down time. Preventive maintenance schedules shall be conducted on weekends as far as possible or any other day through mutual agreement with consignees. Released parts against replacement may be handed over to contractor. Total breakdown hours shall be calculated after discounting grace period and preventive maintenance period.
13.7	The Consignee, without prejudice, shall be entitled to forfeit the amount of WBG furnished in respect of Warranty in the event of any default, failure or neglect on the part of the Contractor in the fulfillment or performance in all respects of the warranty provisions under reference or failure to extend the validity of WBG for the period of break down occurred during warranty period. Breakdown period exceeding 1000hours annually, apart from enchasing WBG other actions like noting adverse performance of the bidder and / or agent for future tenders and their offer in the subsequent tenders will not be considered for placement of any order. The firm will then request to Consignee

	for release of WBG annexing the performance appraisal report as per Annexure-D of Section-VI.		
13.8	Record of breakdown (duly signed by shop incharge) in hours on quarterly basis should be maintained by the consignee and joint report with the contractor shall be made for each breakdown attention. At the end of first and second year of warranty, these details of breakdown hours during warranty period should be advised to PCMM and PCME CENTRAL RAILWAY as per performance appraisal report given in Annexure – D of section –VI. The firm will then request to Consignee for release of WBG annexing the performance appraisal report as per Annexure-D of Section-VI and the breakdown details. In case of Break down period exceeding 1000 hours annually encashment of Warranty Bank Guarantee besides other action like noting adverse performance of the bidder and / or agent for future tenders and their offer in the subsequent tenders will not be considered for placement of any order.		
13.9	Tenderer shall undertake to supply spare parts for a period of expected life of machine.		
13.10	During warranty period, tenderer shall attend for break down as soon as possible, but in no case later than 72 hours of receipt of intimation of the breakdown.		
14.0	BOUGHT OUT ITEMS		
14.1	The bidder shall furnish along with the offer a list of all critical items/ sub- assemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc. The successful bidder may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.		
14.2	The bidder should clearly indicate that in case of components/sub assemblies taken from reputed companies , the parent company has already entered into contract with their Indian units/affiliates for undertakings repairs/after sales service during warranty and post warranty.		
	S. No.	Sub-assembly	Make
	1	CNC & Drive Controller	
	2	Hydraulic pumps and valves	
	3	Feed back Devices	
	4	Ball screws	
	5	Air conditioner for Control cabinet	
	6	Spindle Bearings	
	7	Centralised Lubrication System	
	8	Electrical Control Cabinet	
	9	Servo Controlled Voltage Stabilizer	
	10	Ultra Isolation Transformer	
	11	Ball bearing, roller bearing & main thrust bearings	
	12	Electromagnetic clutch	

	13	Toolings	
	14	A.C. Motors	
	15	Brake motors	
	16	Proximity Switch	
	17	Contactors	
	18	Limit switches	
	19	Push button	
	20	'O' Rings & rubber seals	
	21	Hydraulic Pumps & Valve	
	22	Pneumatic Control Equipment	
	23	Control gears	
	24	Filters	
	25	Belts	
	26	Cable/wire	
	27	Gear reducer	
	28	AC Drive	
	29	AC Servo Motor	
	30.	PLC	
	31.	Couplings	
	32.	Hour Meter	
	33.	Ammeter & Voltmeter	
	34.	Air circuit breaker	
	35.	Connectors	
	36.	Hydraulic oil air cooler type heat exchanger	
	37.	Chiller type heat Exchanger	
	38.	Hydraulic Oil	
	39.	Hydraulic seamless tubes	
	40.	MCCB	
	41.	Chip Conveyor	
	42.	Hydraulic Hoses	
	43.	Hydraulic Motor	
	Note: In case any other reputed make is offered, satisfactory justification for the same will have to be given in the offer.		
15.0	COLOUR: The machine and its accessories shall be painted in Gentian Blue Color RAL shed no. 5010, (if any specific colour code standardized by BIS is available, the same be given). The machine can also be painted in equivalent IS/DIN/other International Standards. If there is a standard color scheme of the manufacturer, the same may also be considered if specified.		
16.0	WARRANTY OBLIGATION – The following conditions regarding Maintenance and		

	reliability shall also apply:-					
16.1	The machine shall be designed for a life of 20 years with regular maintenance and all the structural members of the machine and the foundation shall be guaranteed for 20 years against cracks breakages and etc. during the course of normal operations.					
16.2	All replacement and repairs that the purchaser shall call upon the contractor to deliver or perform under this warranty shall be delivered and performed by the contractor within 1 (one) week, promptly and satisfactorily. The warranty period will be extended by the number of days the machine remains under breakdown during the warranty period and the warranty Bank Guarantee would be returned at the end of such extended warranty period for the full machine.					
16.3	The warranty period in the offer shall survive for a period of 24 months from the date of commissioning of machine. If the offer is found with less than 24 months or ambiguous/uncertain on warranty conditions, the tender is liable to be rejected. The warranty period would also cover comprehensive preventive maintenance, which will be inclusive of all spares, material and labour cost.					
17.0	COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT					
17.1	Tenderers are required to quote for a comprehensive Annual Maintenance Contract for the machine supplied against this specification for a period of five years on yearly basis giving the rates for each year i.e. first year, second year so on., which is inclusive of all spares, material and labour costs. The duties and taxes as applicable should be indicated separately. Released parts against replacement shall be handed over to contractor. All consumables spares and materials shall form a part of the scope of comprehensive CAMC except as follows:					
17.1.1	Diesel/ fuel, oils, greases or coolant.					
17.1.2	Major machines elements/structural members which are under guarantee for a period specified in clause 16.1 as stipulated in 'warranty obligations' requirement.					
17.2	CAMC shall be operated, managed and paid by the consignees indicated under clause 3 of Section IV. The consignee shall indicate the bill payment authority & custodian of the CAMC BG. No further agreement is required for operating CAMC at consignee end.					
17.3	CAMC is a part of scope of supply, in case of concomitant requirement and included in commercial evaluation criteria vide clause 5 of Section-IV. The detailed terms and conditions of CAMC shall be as given in following clauses:					
17.3.1	The duration of CAMC shall be 5 years from the date of expiry of warranty. Rates for CAMC shall be quoted by the tenderer on yearly basis, which will remain applicable during the duration of CAMC and not subject to any variation except any statutory changes in taxes and duties as compared to quoted rates.					
17.3.2	The tenderer must provide CAMC services at the consignee location without any precondition. The CAMC should include complete responsibility for the bought outsub assemblies and components like CNC system, diesel engine, AC unit etc.					
17.3.3	The details of preventive maintenance services including cleaning of machine to be provided under CAMC shall be provided by the tenderer in the following format.					
	S. NO	TYPE OF PREVENTIVE SCHEDULE	PERIODICITY	ITEMS TO BE CHECKED	ITEMS OF REPLACEMENT	EXPECTED PLANT DOWN TIME
17.3.4	Preventive maintenance shall preferably be conducted on weekends through mutual					

	agreement with the consignee. Each preventive maintenance schedule normally shall not exceed one day. The total shutdown time for preventive maintenance should be kept as low as possible but not more than 60 hours/month (averaged over the quarter) including time for cleaning, weekly, fortnightly, monthly, quarterly schedules etc. The preventive maintenance regime offered must be aimed at achieving minimum 90% uptime of the plant excluding the plant down time for preventive maintenance schedules.		
17.3.5	The tenderer shall ensure that in case a failure is reported by a consignee, qualified service engineers visit the site within 3 days from the date of complaint on calendar days' basis. This period of 3 days (excluding date of complaint) after the failure report shall be treated as grace period, which will not count towards plant down time for upto one failure per quarter and a maximum of 4 failures per annum. Incase, the number of failures exceeds one during any quarter or four during any year of CAMC, grace period of only 2 days is permissible for such additional failures. Complaints shall be lodged by consignee by fax, e-mail or per bearer at address given by the tenderer. The responsibility to keep the failure reporting address details current will rest with the tenderer.		
17.3.6	Incase preventive maintenance is carried out alongwith breakdown maintenance schedule; preventive maintenance time is deducted from breakdown time of the plant.		
17.3.7	Penalty Clause: Penalty shall be levied on the tenderer for maintaining plant up time below the limit of 90% calculated on working days basis, after discounting for grace period and preventive maintenance period. Penalty shall be calculated as %age of quarterly payment and is deducted from the respective quarterly payments. Penalty calculation is done over quarterly payment period.		
	S. No.	Availability Slab	Applicable Penalty
	1.	90% to 80%	0.5% for every 1% (or part there of) reduction in availability of plant below 90%.
	2.	Below 80%	1% for every 1% (or part there of) reduction in availability of plant below 80%.
17.3.8	A Bank Guarantee equal to 10% of the total value of CAMC for 05 years subject to a minimum value of 2% of total value of Contract (excluding CAMC charges) will be submitted by the tenderer to the consignee 90 days before the expiry of warranty. The CAMC will have the validity of 5 years 6 months. The bidder can submit multiple BG for lesser duration to cover the period of 5 year 6 months ensuring the uninterrupted validity of the CAMC BG for 5 year 6 months. The confirmation for the submission of this BG will be submitted to consignee for the release of WBG. The CAMC BG will be returned on completion of CAMC period. In case, the tenderer fails to provide CAMC services successfully; the CAMC BG will be forfeited. This will be in addition to penalty as per clause 17.3.7 above. This provision would not be applicable where the advance payment is made.		
17.3.9	Plant up time of less than 60% for two consecutive quarters will constitute complete failure of tenderer to provide the CAMC services successfully and will result in forfeiture of CAMC BG , besides other action like noting adverse performance of the bidder for future tenders and their offer in the subsequent tenders will not be considered for placement of any order. This is in addition to penalty clause 17.3.7 above for the period of actual performance.		
17.3.10	As per clause 5.1 of Section V, it is the sole responsibility of the bidders to stock all spares and materials as required for smoother execution of CAMC in order to achieve response time in compliance to machine availability as per stipulated requirements.		

17.3.10.1	In all cases of plant failure except as mentioned in clause 17.3.10.2 of section V, any other spare part or material necessary to restore the plant to proper working order is arranged by the tenderer as a part of CAMC.
17.3.10.2	In case of damage to the machine on account of any external factor, viz., floods, earthquake, fire, arson or sabotage, entire cost of spare parts and material necessary for repair of the plant shall be borne by the railways. However, the tenderer shall provide services of their engineers free of cost as a part of CAMC to restore the plant to working order.
17.3.10.3	In case of damage to the plant as mentioned in para 17.3.10.2, any spare parts and material necessary to restore the plant to proper working order shall be arranged by the tenderer and charged on actual basis duly certified by authorized railway official in the next quarterly bills. The rates charged for such spare parts shall be based upon the spare part rate list provided by tenderer in compliance of clause 5.1 of Section IV or any other valid document. The tenderer shall furnish documents to support the rates charged for spares used for repair under para 17.3.11.1
17.3.11	Normally quarterly payment (@ 1/4th of the annual quoted rates) under CAMC is made to the tenderer within 30 days from the end of that quarter subject to submission of the following documents by the tenderer to the paying authority assigned by the consignee:
17.3.11.1	Consignee's certificate for work done as per Annexure- F of Section-VI with calculation of down time and penalty applicable.
17.3.11.2	A certificate by consignee that no spare part is due with the tenderer as per clause 17.3.10 above.
17.3.11.3	Bills submitted by the tenderer & accepted by consignee.
17.3.11.4	Attested photocopy of the CAMC BG.
17.3.12	The CAMC contract can be terminated in following ways:
17.3.12.1	Consignee may terminate the CAMC in the event of failure of tenderer to provide CAMC services of the agreement in addition to encashing of CAMC BG as per clause 17.3.8.