RAIL COACH FACTORY, KAPURTHALA			
Specification No.	**Description**	**Page No.**	**Date**
Mech/M&P/3700/3 Rev.- Nil	CNC Milling Machine	1 of 44	19/03/2024

Table of contents Sections I, II, III

Section – I

	IMPORTANT FEATURES OF THE TENDER
1	**INSTRUCTIONS TO BIDDERS FOR FILLING TECHNICAL BID**
1.1	Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with International (CE/ISO/DIN/JIS)/National standards (IS) (wherever applicable).
1.2	Tenderers should offer and quote for all the specified concomitant accessories, as these are considered essential for commissioning and utilization of the machine. Even if bidder does not recommend the purchase of any of these accessories, the price must be quoted for comparison purposes and their recommendation/suggestion to be indicated in the offer. Tenderers should also quote for optional accessories, spares and consumable spares as asked in the specifications.
1.3	In case, any item is required in sets, please specify nos./pieces per set. This is essential for proper technical evaluation of the offer. Offers received without this may be considered as incomplete and liable to be rejected
1.4	The bidder should quote only for the specified make of sub-assemblies and equipment wherever specified. In case, some other make is quoted, specific reasons for the same including its features/advantages over specified makes should be submitted. Past performance of same/similar machine from two or more end users may be submitted to evaluate performance of other items offered. Details of industries/entities/Customers/products using the offered brand, details of manufacturer, should be submitted to evaluate the market presence of the make quoted; in case details are not submitted alternate brand/item will not be considered & offer will be evaluated accordingly.
1.5	In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure or some other document enclosed by the tenderer), unless specifically mentioned in the deviation cum confirmation statement under Annexure A of Section III, the values as given in Bid Document Part-II shall be taken as confirmed by the tenderer and offer evaluated accordingly.
1.6	Bidder or his authorized agent, in their own interest, should visit the consignees listed in clause 3 Section-I with prior appointment with Controlling Officer of the consignee and acquaint themselves with existing process of manufacturing/remanufacturing, site conditions, availability of material Handling facilities etc.
1.7	The Purchaser may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Purchaser in this regard shall be final. A copy of the alternative specifications offered should be sent along with the offer. The Tenderer should also furnish “Statement of Deviations” from tender specifications (as per Annexure A, Section-III) along with the offer.
1.8	In order to assess the manufacturing capability of OEM and to be assured regarding OEM’s manufacturing facility/ facilities in India and hence the ability of its Authorized Distributor to supply the said machine, a self certified Capability Assessment report of the OEM as per Annexure-H must be submitted by the bidder along with their offer. In addition to above, if felt necessary by the Purchaser, an inspection by actual visit to his works/ office can be carried out by representative of Purchaser/ Third party agency as nominated by the purchaser (TPI cost to be borne by the bidder) to verify the details furnished vide Annexure-H. The bidder is bound to comply with the same, without fail.
1.9	The Purchaser may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Purchaser in this regard shall be final.
1.10	Purchaser reserves the right to verify the details submitted by the bidder by actual site visits.
1.11	Other terms & condition of the contract will be as per Indian Railway Standard conditions of contract.
1.12	Tenderer not submitting the requisite information may note that his offer is liable to be ignored.
1.13	Tenderer shall design the arrangement as per RCF requirement.
1.14	The CAMC (Comprehensive Annual Maintenance Contract) shall be kept for a period of 05 years after the completion of the warranty period, irrespective of the type of machine/equipment. The tendered item shall be treated as Non-Critical from CAMC point of view.
1.15	Bidder shall quote year-wise CAMC cost for a period of 5 years in the following format:

	<table><tr><td>Year</td><td>AMC Charges (in Rupees) Without Taxes</td><td>Remarks</td></tr><tr><td>Ist Year</td><td></td><td rowspan="5"></td></tr><tr><td>IInd Year</td><td></td></tr><tr><td>IIIrd year</td><td></td></tr><tr><td>IVth year</td><td></td></tr><tr><td>Vth year</td><td></td></tr></table> In case, any bidder has not quoted year-wise cost of CAMC and only single value has been offered for 05 years CAMC, linear cost division method shall be followed for calculating yearly CAMC cost. It will imply that CAMC cost of each of the 05 years will be total quoted CAMC cost divided by tenure in years of CAMC.
1.16	For CAMC, a Bank Guarantee (BG) equivalent to 10% of the PO value of the machine/ equipment shall be deposited by the contractor to the concerned division/section of Executive department as authorized by PHOD/ CHOD of the department, 90 days before the expiry of warranty. BG shall have validity of 5 years and 6 months. The period of CAMC can also be decided to be less than 5 years, if need be at this stage, with the approval of PHOD/CHOD, in which case the validity of BG will be decided accordingly. In addition to the above, Railway reserves the right to cancel the CAMC at any stage of Contract.
1.17	As indicated above, CAMC cost shall be made part of Evaluation Criteria of the Tender. However, this cost will not be part of the Contract Value (PO value).
1.18	The CAMC payment will be made quarterly after certification by the consignee/user regarding satisfactory performance.

2.0	**Description**	
2.1	A CNC Vertical Milling Machine (Vertical Machining Centre) as per specification No. **Mech/M&P/3700/05** is required for performing various operations such as milling, facing, boring, drilling and tapping on the components listed in Annexure-F.	
2.1.1	The machine shall be supplied **Tooled up with all tools** capable of machining the components listed in Annexure-F, as per the machining requirements of the component to its finished sizes and tolerances. The firm is also required to supply **CNC Part program** for the components listed in Annexure-F.	
2.1.2	The machine should be capable to work in severe workshop conditions at full capacity continuously in three shifts with ambient temperature 0^0C – 50^0C, relative humidity up to 98% and dusty environment. Changes in ambient conditions should not affect the performance of machine.	
2.2	**Leading parameters:** Machine shall conform to the following major & other parameters. The bidder should furnish the values of these parameters at S.N. 1. Of Para 11 of the enclosed Annexure-A.	
	SCHEDULE-I	
	MAJOR PARAMETERS:	
2.2.1	**TABLE (Fixed)**	
2.2.1.1	Table size	1000 x 600 mm
2.2.1.2	T-Slot size	7x14x80 mm
2.2.1.3	Clamping Area	950 mmx500 mm (minimum)
2.2.1.4	Maximum Load on Table	700 kg
2.2.1.5	Minimum distance from floor to Table Top	900 mm
2.2.1.6	Swivel of Table either side	200 mm
2.2.2	**CAPACITY**	
2.2.2.1	X –axis (Longitudinal travel)	750mm (minimum.)
2.2.2.2	Y- axis (Cross travel)	560 mm (minimum)
2.2.2.3	Z –axis (Vertical travel)	560 mm (minimum)
2.2.2.4	Distance from Pallet top to Spindle Nose (Vertical)	100 mm
2.2.2.5	Distance from Pallet top to Spindle Nose (Horizontal)	300 mm
2.2.2.6	Maximum Job dia and height	ϕ 800 x 550 mm
2.2.3	**Feed & Acceleration**	
2.2.3.1	Rapid Traverse (X/Y/Z –axis)	30 m/min
2.2.3.2	Acceleration (X/Y/Z –axis)	5 m/sec^2
2.2.3.3	Cutting Feed	10 m/min
2.2.3.4	Range of feed motion in X/Z Axis	1mm/min to 3000 mm/min
2.2.3.5	Range of feed motion in Y Axis	1mm/min to 4000 mm/min
2.2.3.6	Minimal feed motion X/Y/Z Axis	0.1 mm/min
2.2.3.7	Minimal feed motion B- Axis (Table Rotation)	0.1 deg/min
2.2.4	**Electro SPINDLE**	
2.2.4.1	Spindle speed	20-12000 rpm or better
2.2.4.2	Spindle Power (S1)	23.6 kW
2.2.4.3	Spindle Torque	110/84 Nm
2.2.4.4	Spindle Nose/taper	ISO40
2.2.5	**Rotating Head (B-Axis)**	
2.2.5.1	Spindle Axis/Saddle Plane	+30/ -120 deg
2.2.5.2	Rotating speed	35 rpm
2.2.5.3	Acceleration	40 rad/s^2
2.2.6	**Automatic Tool Changer**	
2.2.6.1	No. of Tools	24
2.2.6.2	Max. Tool Dia (All/Adj. Empty)	75/125 mm
2.2.6.3	Tool Weight Max.	7 kg
2.2.6.4	Tool Length Max.	300 mm
2.2.7	**Accuracy**	
2.2.7.1	**Positioning Accuracy**	
2.2.7.1.1	X less than 500mm Position	0.01mm
2.2.7.1.2	X less than 500mm Position	0.015mm
2.2.7.2	Repeatability	0.005 mm
2.2.8	**OTHER PARAMETERS:**	
2.2.8.1	Swing Over Bed	200 mm

2.2.8.2	Swing Over	115 mm
2.2.8.3	Distance between centers	400 mm
2.2.9	**HEADSTOCK**	
2.2.9.1	Spindle Bore	20 mm
2.2.9.2	Spindle Bearing & Speed	taper roller, 0-2000 rpm
Note:	**No deviation shall be permitted in Major parameters.**	

2.3	**Geometrical and Performance Standards**
2.3.1	The machine shall conform to ISO 10791 or DIN 8615 or equivalent JIS or equivalent International standard for Geometric accuracy and work piece cutting test. The positional accuracy and repeatability shall be as indicated in Schedule-I.
2.4	**Capability Requirement**
	Machine should be capable to machine the components as per Annexure-F.
2.4.1	The machining time should be such that the same can be maintained for regular 8 hour shift for double shift working, six days a week with machine availability of 85% without affecting reliability and accuracy of the machine over its working life.
2.4.2	The timing should be maintainable for regular 08 hrs shift for Single/Double/Triple shift working 6/7 days a week with machine availability of 85%.
2.4.3	The machine manufacturer/ bidders shall furnish the quantified productivity norms for machine offered by them in term of different types of components as listed in Annexure-F in their offer. The machine manufacturer shall require demonstration of productivity parameters during commissioning/ testing performance of the machine at respective consignee end.
2.4.4	The machine should be capable to meet the Capability requirement per 8-hour shift at 85% availability of the machine for each component as mentioned in Annexure-F .
2.5	**Prove Out at Firm's Premises** The firm is required to demonstrate the following at the time of inspection in addition to their normal checks carried out during assembly & testing as part of quality control measures: -
2.5.1	The following tests/prove out operations are required to be carried out at manufacturer's premises as per clause 2.3 i) Geometric and performance tests ii) Positioning accuracy and repeatability test.
Note:	i) Actual test schemes for each of the above tests shall be performed by the manufacturer as given in the offer. ii) Test pieces for prove out of above tests at Firm Premises shall be arranged/supplied by the firm.
2.5.2	Geometric and performance tests as per clause 2.3
2.5.3	Positional accuracy and repeatability test as per JIS/VDI/VGQ3441
2.5.4	No load or reliability test for a minimum period of 48 hrs. Initially, 24 hours with adjustment and subsequently 24 hours without adjustment – in case any adjustment is required during this period, then the test should be repeated for another 24 hours without adjustment.
2.5.5	Vibration test- The actual test scheme shall be furnished in the bid
2.5.6	Spindle stabilization test for 16 hours (minimum duration) – The actual test scheme shall be furnished in the bid.
2.5.7	Cutting test as per NAS test Scheme 979, actual test scheme to be provided by the bidder
2.5.8	Renishaw Ball bar contouring test for the spindle – Test scheme / tolerance range shall be furnished in the offer
2.6	**Prove-Out at Consignee's premises**
2.6.1	The supplier shall be required to prove out the machine for two continuous shifts as per claimed capability after commissioning of the machine at consignee premises. The material will be provided by the consignee and tooling's shall be arranged by the supplier for prove out of the machine.
Note:	Tools & Equipment required for installation of the machine and Set of Test Mandrels/Special Gauges for checking spindle run-out & alignment of headstock/column etc. should be arranged / Brought by the bidder.
2.6.2	Productivity/ Performance Capability test shall be performed for two consecutive shifts for a period of 1 days covering the components as per clause 2.2 above within the time period for installation, commissioning and prove out, stipulated in the Delivery Schedule Chart (clause 7 of Section-I of bid document part-II). The cycle time/ productivity per item/ component shall be arrived at by calculating

	the average of the time taken per products of the total numbers produced in a shift or over the time/Quantity specified for the test. If the cycle time/ Productivity is Capability requirement as per clause 2.4, is proved out the machine shall be considered as commissioned. Thereafter the performance shall be watched for a period of one month by the consignee before the final PTC is issued.
2.6.3	If the supplier fails to demonstrate during the first Performance/ Productivity Guarantee Capability requirement Test/, the Performance as per Clause 2.4 above, the Railway shall permit the supplier to carryout necessary modifications and repairs to the equipment and to repeat the Performance/ Productivity Guarantee Test. Joint inspection in presence of inspecting agency, consignee and supplier shall be carried out before permitting suppler for any modification/repair (if any).
2.6.4	Extra cost incurred for retention of specialists and for modifications and repairs to the equipment in connection with the repetition of Capability requirement Performance/ Productivity |Guarantee Test shall be borne by the contractor.
2.6.5	The repetition of performance guarantee/ tests shall be completed within 90 days after the expiry of stipulated time period provided in the contract for Installation, commissioning and proving out of machine.The consignee shall adhere to the clause 2.6.7 stipulations for repetition of performance guarantee/ tests.
2.6.6	**Consignee's Right of Rejection** — Notwithstanding any approval which the inspecting Officer may have given in respect of the stores or any materials or other particulars or the work or workmanship involved in the performance of the contract (whether with or without any test carried out by the Contractor or the Inspecting Officer or under the direction of the Inspecting Officer) and notwithstanding delivery of the stores where so provided to the interim consignee, it shall be lawful for the consignee, on behalf of the Purchaser, to reject the stores or any part, portion of consignment thereof within 90 days after expiry of the stipulated time provided in the contract for the commissioning of the machine or in case the commissioning is completed after the stipulated time, after commissioning of the machine at the place or destination specified in the contract if such stores or part, portion of consignment thereof is not in all respects in conformity with the terms and conditions of the contract whether on account of any loss, deterioration or damage before dispatch or delivery or during transit or otherwise howsoever. The rejection advice issued by consignee may be in the standard format as per Store Code Vol-I, Para 764.
2.6.7	Any break down time caused by reasons beyond the control of contractor during prove out will not be reckoned for the purpose of levying the penalty
3.0	**Quantity & Consignee**

S. No.	**Consignee**	**Key No. (RCF ID)**	**Quantity Required**	**Specification No.**
1.	Dy CME/MFG RCF/KXH	222211	01	**Mech/M&P/3700/05**

4.	**SCOPE OF SUPPLY:**
4.1	The scope of supply shall include design, manufacture, supply, installation, commissioning and proving out of CNC Milling Machine for operations on various sizes of plates, bars and sections of all components of any machinable material(i.e. Aluminium, Copper, Mild Steel, Stainless Steel, Die Steel, Tool Steel etc). listed in Annexure F ON TURNKEY BASIS inclusive of foundation related civil work. The supply shall include all the concomitant accessories/ equipment, which the manufacturer considers essential to make the machine fully operational, when installed and commissioned. It shall also include installation and commissioning of related equipment, training of personnel in operation and maintenance of machine and supply of technical documentation. The Preventive Maintenance of the machine during warranty period and CAMC period shall be in scope of supplier.
4.2	**CONCOMITANT ACCESSORIES:** The CNC Milling Machine shall be accompanied by the following concomitant accessories whose cost shall be quoted individually:

4.2.1 Set of cutting tools for machining of components as mentioned in Annexure-F:

i) Basic Tool holders for boring bars, inserted carbide drills, reamers, inserted milling cutters and taps- 02 nos. of each type

ii) Cutting tool holder e.g. adopter for milling cutter, boring bars etc.- 02 nos. of each type

iii) Consumables: -

a. HSS cutting tools like drills, taps, reamers- 02 nos. of each size

b. Milling cutters- 02 nos. of each type

c. Throw away carbide inserts of various types used on milling cutters, HSS drills, boring bars etc. (Description of each type with ISO nomenclature should be enclosed) – 25 nos. of each type

iv) Any other tool or tool attachment required for machining of aforesaid components (Bidder shall givefull description and unit rate). - 02 nos. of each type & size.

v) The details of tooling should be furnished in the following format:

S. No.	Component	Operation	Cost	Basic tool holder and adopter	Qty. of each basic tool holder and adopter	Consumables like drill, tap & reamers etc	Qty. of each consumable	Throw-away Carbide inserts used	Qty. of each insert

Note: i. The tooling layout diagram for each machining operation mentioned in Schedule-I should be given separately.

ii. Coated inserts selected should have maximum number of cutting edges. Wiper inserts would be preferred. The offered tooling should provide maximum tool life at optimum cost.ISO holders and ISO inserts should be used to the extent feasible.

iii. Tool holders may preferably be offered from the indigenous sources of SANDVIK / KENNAMETAL-WIDIA / Mitsubishi/ISCAR. The machine manufacturer's own make tool holders are also acceptable in case of reputed firms.

iv. Cutting Tools shall preferably be offered of SANDVIK/WIDIA-KENNAMETAL/ ISCAR/ Mitsubishi/ Guhring / Seco /Titex makes for which indigenous sources are also available.

v. Efforts should be made to rationalize the turning/facing/grooving tool holders/shanks, drills, taps, reamers, adopters, collets and inserts to the extent feasible. Objective should be to reduce the variety and also inventory of the toolings.

4.2.2 Coolant system as per clause 3.7 of section-II- 01 set

4.2.3 Heavy Duty Blowers with filters & heat dissipation system for CNC & Electronic Controllers(Qty., make & power of the blowers to be given by the bidder) - 01 set

4.2.4 Static Voltage stabilizer as per clause 2.13.2 of Section-II - 01 no

4.2.5 First fill of hydraulic oil, cutting oil, coolant, lubricants and grease etc. - first fill

(Grade, source and quantity to be indicated in the offer).

4.2.6 Motorized Chip conveyor with bin to remove swarf generated by the machine to be deliveredoutside the machine area - 01 no.

4.2.7 All foundation bolts and levelling wedges required for installation of the machine - 01 set

4.2.8 Complete set of maintenance tools for electronics and mechanical maintenance (one set each) and operation tools - 01 set

(Description, quantity, make and cost of each tool should also be given)

4.2.9 Electronic hand wheel (Manual Pulse Generator) for axes movement mounted on flexiblependant with at least 2.5 meters flexible conduit cable - 01 set

4.2.10 Set of measuring probes system as per clause 1.9 of Section-II - 01 set

(Description of model of system along with components and technical catalogue shall be furnished).

4.2.11 Set of Carbide ball nose cutter - 02 nos. of each type.

4.2.12 Tapping attachment upto M20.

4.2.13 Set of fixtures for locating & holding the components for carrying out operations on all the components listed at Annexure-F of Section-III. Fixtures shall be made from case hardened or nitride material such as 16MnCr5/90MnCrV8/20MnCr5 conforming to DIN or equivalent ISO standards. Bidders shall furnish the quantity of fixtures required for each component.

4.2.14 Apart from the above concomitant accessories, any other accessory/equipment essentially required to make the machine fully functional when installed and connected to power source, shall also be included in scope of supply, which shall then be treated, as a concomitant accessory for that particular bidder. The bidder shall essentially quote it separately.

Note:- i) The bidder may offer voltage stabilizer and Ultra Isolation Transformer of Neel/Servomax

ii) Lubricating oil and coolant should preferably be sourced from Indian sources like IOC, BPCL, HPCL, Castrol, Esso (In case, the same are not sourced indigenously, the equivalent available with these Indian sources shall be indicated)

4.3	**OPTIONAL ACCESSORIES:** The following optional accessories should be quoted separately and prices of these should not be included in the basic price of machine. The detailed technical features for each system should also be given
4.3.1	Diagnostic kit as a Laptop of reputed make like HP / IBM / Compaq / Dell with carry bag having latest MS Window software and MS office software & Communication software for downloading and uploading of part programs through RS232 serial port & PLC Program through MPI Port on CNC machine, DVD-RW combo drive, latest I-7 processor, 512 GB SSD hard disk and all other supporting licensed software. – 01 set
4.3.2	Ultra isolation transformer as per clause 2.13.2 of Section-II- 01 no.
4.3.3	Any other item which can result in improved productivity or additional capability may be quoted as optional accessory with full description and advantages it offers

5.0	**EVALUATION & ELIGIBILITY CRITERIA**
5.1	**EVALUATION CRITERIA**
	Total value of the offer will be calculated based on (i) The cost of the basic machine. (ii) Cost of the concomitant accessories according to tender specifications. (iii)Cost of any other accessory which in the opinion of supplier is essentially required for making the machine fully functional. iv) Cost of Turnkey Charges viz. foundation, installation & commissioning etc. (v) Cost of Preventive Maintenance during 1st & 2nd year of Warranty Period. (vi) Duties and taxes as quoted by the bidder, insurance and freight. (vii) Cost of Comprehensive AMC charges for 5 years after completion of warranty period. Note: Cost of CAMC for 5 years to be part of commercial evaluation. However this will not form part of contract value.
6.	**OTHER ITEMS TO BE QUOTED:**
	The following items will need to be quoted additionally though will not be part of commercial evaluation: (i) Optional Accessories with break up of individual items as specified in clause 4.3 of Section-I (ii) Consumables as per clause 6 of Section-II with breakup of individual items as applicable. (iii) Spares for two years normal operation and maintenance as per clause 5 of Section-II.

7.	**DELIVERY SCHEDULE CHART:**
	In the event of acceptance of the offer, the machine shall be supplied as per the following Milestone Chart: **Name of the Machine:** CNC Milling Machine **Specification No. Mech/M&P/3700/05**

S.No.	Activity	Activity Code	Outer Limit of Time Schedule expected by RCF
1.	Issue of LOA	D1	-
2.	Submission of PBG By Successful Bidder	D2	D1+30 days
3.	Issue of AT / Contract By RCF (after verification of PBG)	D3	D2+30 days
4	Submission of GA drawings and requisition for the trial component (s) (if applicable) to consignee by Successful Bidder/Supplier along with information on power and other utilities required for machine.	D4	D3 + 45 days
5.	Approval of GA drawings by consignee (to be governed by clause 11.2 of Section-II) and confirmation of availability of components to be proved out at manufacturer premises and value of BG required for providing prove out components.	D5	D4+ 45 days
6.	Confirmation of availability of clear site by consignee and availability of utilities (air, power, water)	D6	By D5 (i.e. at the time of approval of GA Drg.)
7	Completion of foundation	D7	D6+150 days
8	Submission of BG and collection of components from consignee by the	D8	**D5 + 60 days**

	supplier for prove out of machine at manufacturer's works.		
9	Supply/ Delivery of machine	D9	**For First machine:** D6 + 180 Days **There after subsequent machines**: @ one machines per month
10	Power connection for the machine and other on site requirements to be provided by railways	D10	**D7 + 7 days**
11	Issue of Joint Receipt Note as per annexure-II and railway to give call to supplier for the commissioning of machine.	D11	D10 + 7 days
12	Generation of Receipt note through UDM by consignee.	D12	**D11 + 7 days**
13.	Railway to give call to supplier for the commissioning of machine	D11	**D9 + 7 days** **Or** **D10 + 7 days** **(whichever is later)**
14	Installation, commissioning and proving out of machine by supplier	D12	D10 + 120 days or D11 + 120 days (whichever is later)
15	Issue of PTC by consignee	D13	D12 + 30 days
16	Generation of CRC in UDM by Consignee	D14	**D13+7 days.**
17	Warranty by supplier	D14	D12 + 2 years
18	CAMC	D15	D14 + 5 years

Notwithstanding the delivery period indicated elsewhere in the tender document, the delivery indicated in this schedule shall be taken as overriding and final.

Section-II

TECHNICAL SPECIFICATION

ABBREVIATIONS

A-1,A-2, A-3, A-4	Standard paper sizes
AC	Alternating Current
CAMC	Comprehensive Annual Maintenance Contract
AT	Acceptance of Tender
BG	Bank Guarantee
CME	Chief Mechanical Engineer
CME/PCM	Chief Mechanical Engineer/Post Contract Management
CNC	Computer Numeric Control
RCF	Rail Coach Factory, Kapurthala
COS	Controller of Stores
Db	Decibel
DC	Direct Current
FA&CAO	Financial Advisor & Chief Accounts Officer
GA (Drawing)	General Arrangement (Drawing)
HRC	Hardness Rockwell ‘C’ Scale (value)
Hz	Hertz
IEC-Pub	International Electro technical Commission - Publication
JCN	Joint Commissioning Note
JRI	Joint Receipt Inspection
kW	Kilo Watt
LC	Letter of Credit
LD	Liquidated Damages
LOA	Letter of Acceptance
NC	Numeric Control
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 six Railway Production Units e.g. RCF, ICF, CLW etc.)
RDSO	Research Design & Standards Organization
SS	Stainless Steel
WBG	Warranty Bank Guarantee

1.	**BASIC DESIGN FEATURES:**
1.1	**Safety features** 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 should be available on the machine, are mentioned below: -
1.1.1	When feed hold is 'ON'; all slide motions are to be inoperative.
	Software limit switches are to be provided to restrict the total slide travel, maximum feed velocity and maximum spindle speed. Hardware features should also be available for controlling the above movements.
1.1.2	On actuation of overload relays, the machine should become inoperative.
1.1.3	Indication for inadequate lubrication oil, supply.
1.1.4	Load meter should be provided to indicate the load on spindle drive motor, so that the load on the motor can be maintained within the safe limits.
1.1.5	When any of the machine functions like spindle rotation, slide movement, etc. come to a stop without being programmed to stop, the machine should also come to a stop and should be operative only in the manual mode till the fault is rectified.
1.1.6	The machine manufacturer must place suitable 'Warning Boards' for protection of the operator and the machine at suitable locations.
1.1.7	Suitable interlocks should be provided to protect the machine in the event of faulty sequence, hydraulic oil failure, lubrication failure, pneumatic system failure, fluctuation in voltage and frequency, non positioning of safety guards and resumption of power supply after power failure.
1.1.8	Mushroom type master emergency stop shall be provided on the machine, which shall be easily accessible and capable of disabling the machine, drives in case of any emergency. The offer should give specific details of the above safety features present in the machine. In addition, any other safety feature incorporated in the machine should also be clearly specified in the offer. Details of interlocks available may also be specified**.**
1.1.9	**Noise Limit -** The maximum noise should not exceed 85 dB. The measurement should be carried out at a height of 1.5 meter and at a distance of 1 meter from the periphery of the machine as per NMTBA noise measurement technique / ISO 3740-1980 / DIN 45635 / IS 10988. The noise level of the machine in dB should be clearly indicated in the offer along with relevant standards
1.1.10	Machine should be provided with fluorescent light to illuminate work area with minimum illumination level of 300 lux. Number of lamps, operating voltage and wattage may also be specified
1.1.11	Work area enclosure with transparent windows should be provided. The work area should be completely enclosed and interlocked so that no cutting operation in auto mode can take place as long as it is open except for motions in jog mode

1.2	**SPECIFIC CHARACTERISTIC**
1.2.1	**GENERAL**
1.2.1.1	All the machine elements should be properly designed by using finite element method analysis (FEM techniques or equivalent software) to get optimum cross section and ribbing. The machine shall have a design such that all parts are easily accessible for maintenance. The machine should rigid and of sturdy construction designed to meet cutting forces at full load encountered in heavy- duty application under severe workshop conditions. The machines shall be free from vibrations at full load and noise limits should be within limits specified at 3.1.1.9**.** In case, design is based on that of a reputed machine tool manufacturer, it shall also be mentioned in the offer along with details thereof. The exact method followed for designing of machine elements may be specified in the offer. In case, design is based on collaboration with foreign manufacturer, details shall be furnished.
1.2.1.2	All major machine elements such as bed, column, spindle headstock and table etc. shall be of thermo-symmetric design. The elements should be made from highest quality, heavily ribbed, rigid high grade gray cast iron to BS-1452-1990 Grade 250 conforming to DIN 1691 or equivalent standard. The casting shall be suitably stress relieved and aged to ensure dimensional stability andfreedom from distortion over the entire life of the machine. The actual process followed for stress relieving shall be detailed in the offer.

	The firm can also offer fabricated design with equivalent rigidity, vibration damping and other mechanical characteristics. In case of fabricated structure, the steel used for fabrication should be Fe360A or better grade conforming to ISO 630-95 or equivalent conforming to DIN/JIS/ EN standards. The fabricated structure shall be subject to suitable stress relieving cycle. The actualprocess followed for stress relieving should be detailed in the offer. **Note: The details of various element (the bed, column, table etc.) material and heat treatment cycle shall be clearly indicated in the offer. Special design and constructional features of the elements (the bed, column, spindle headstock, table etc.) must be fully explained in the offer.**
1.2.1.3	All mating guideways of X, Y and Z-axis should be hardened (preferably induction) and precision ground. The hardness of guideways shall be 55 +/- 3 HRC. The guideways shall be lined with anti friction strips for stick slip free guide motion. The grinding of guideways should be carried out on precision grinding machine under controlled temperature conditions. The method followed for maintaining controlled temperature conditions may be specified in the offer. The firm should indicate the value of grinding accuracy in micron/meter. Alternatively, linear motion guide ways with roller packs of reputed make like THK/ INA/ REXROTH-STAR/Schneeberger shall be provided.
1.2.1.4	All the guideways for X, Y and Z-axis shall be suitably protected with wipers and heavy-duty telescopic covers / bellow covers made of stainless steel to prevent ingress of coolant swarf and dirt. Telescopic covers/ bellow covers & wipers for all axes should be from reputed make. Scrappertype of motorized chip conveyor shall be provided for easy chip disposal. The actual make of telescopic covers/bellow cover/rollaway covers/ wipers shall be indicated in the offer.
1.2.1.5	Detailed drawing of the offered machine clearly indicating the various machine parts and accessories shall be submitted along with the offer
1.3	**MACHINE BED**
1.3.1	The machine bed shall be heavily ribbed for rigidity, stability and vibration free operation. The bed shall have widely spaced guideways/ linear motion guide ways. The bed shall be made of alloy cast iron or fabricated out of structural steel and suitability stress relieved before machining (method of stress relieving should be furnished in the offer).
1.4	**TABLE**
1.4.1	The table assembly shall consist of T-slots provided for clamping of fixture on the table. T-slots shall be as per DIN 650/ IS 2031 or equivalent International Standards. Suitable arrangement for cleaning of table surface through coolant/compressed air shall be available. The number of T-slots on the table and arrangements made for cleaning of table surface shall be specified in the offer. The weight carrying capacity of the table and details of T- slots such as number, width etc. shall be indicated in the offer.
1.4.2	The movement of work table should be preferably through pre loaded re-circulating linear roller guideways whose make, diameter, cylindricity, hardness, pitch and class of accuracy shall be given in the offer (if applicable).
1.4.3	There should be provision of table clamping during the machining operations so that the table shall not drift from its position. The table should be unclamped during its rotational movement. Specific details of the offered arrangement should be furnished.
1.5	**COLUMN**
1.5.1	The column shall be preferably of box type single piece casting of high-grade gray cast iron. Double walled column structure shall also be acceptable with equivalent rigidity, vibration damping, thermo-symmetric design to minimize thermal distortion caused by temperature change and other mechanical characteristics, provided with boring and milling head. It shall be rigid and ensure high static and dynamic stiffness to resist high cutting forces and vibrations.
1.5.2	The CNC swivel milling head should travel on hardened and ground guideways or LM guideways for vertical movement (for Z-direction) through preloaded re-circulating ball screw and double nut arrangement on the column. The ball screw should be of large diameter (permissible within the design parameters) and supported on high accuracy, highly rigid supports. Ball screw / nut should be preloaded. Ball screw arrangement should be inspected for parallelism to axes guides. The ball screw should be of C-3 class or better and of

	THK/Tsubaki/ Schenberger/ INA/ Rexroth STAR/HIWIN make. Actual class of accuracy of the ball screw, value of pre loading and make shall be indicated in the offer. Any machine configuration like X & Y -axis travel by means of Table/Milling Head/Column travel shall be acceptable, provided relevant parameters of Schedule-I are met.
1.5.3	In order to provide stick slip free motion, the slide way of column shall be accurately machined and provided with turcite lining or with linear roller bearing/ track roller bearing to reduce friction and for longer life. LM guideways provided shall be of reputed make like THK/INA/REXROTH- STAR/Schenburger. Hardness & class of accuracy of the LM guideways and make shall be indicated in the offer.
1.6	**CNC MILLING HEAD**
1.6.1	The CNC Milling Head design shall be such that the working spindle can be conveniently replaced as a complete unit during maintenance, if required. The spindle should be short and rigid. The spindle should be supported on sufficient bearings/bearing groups to provide high accuracy and stiffness. The bearings should preferably be of P-4 / SP class accuracy or better and of reputed make such as SKF/FAG/NTN/KOYO/RHP/TIMKEN/SNFA. The spindle shall be of high strength alloy steel of En 353 or equivalent grade of alloy steel such as 15Ni Cr3 to ISO 683-11 or 41CrAIN07 (as per DIN grade) or better grade of steel as per design requirements, case hardened preferably through nitriding up to 60+/-2 HRC and finished by precision grinding or super finishing to provide surface finish of Ra 0.2 - 0.4 microns. Specific details of above arrangement shall be furnished in the offer.
1.6.2	Spindle assembly should also be dynamically balanced as per Grade G 2.5 or better conforming to ISO 1940 -1. The firm should indicate the following details of spindle assembly:
1.6.2.1	Spindle material, hardness value and surface finish value Ra in microns.
1.6.2.2	Degree of imbalance permitted (in gm-cm) for maximum speed of rotation of the spindle (to be specified) or Grade of balancing as per ISO 1940-1.
1.6.2.3	Make and type of bearing,
1.6.2.4	Class of accuracy and country of origin.
1.6.2.5	No. of rows of bearings
1.6.2.6	Class of precision A rotary encoder should record the spindle orientation position. Any gear and drive shaft used in the spindle drive should be hardened and ground. The class of accuracy of gears as per DIN/AGMA Standard may please be indicated in the offer and shall be DIN 6 or better or equivalent AGMA standard. The firm should indicate type of gearing used and range of gear speed. The change over from one range to another should be done automatically with the help of hydraulic cylinder or through servo control mechanism. The details of the same may please be specified in the offer.
1.6.3	The temperature rise of spindle head housing should not exceed 25-300C over the permissible ambient temperature range so as to maintain the accuracy of the machine. For this purpose, the housing should be suitably cooled. The method employed should be clearly explained in the offer.
1.6.4	The spindle headstock should be preferably of high grade Gray Cast Iron casting to ensure heavy milling capability and greater machining accuracy.
1.6.5	Power clamping arrangement for tool shall be provided through draw bar with collets. The mechanism should be explained in the offer. Spindle provided with quick change clamping device with collets for tool change also shall be acceptable. The spindle nose should have provision to prevent ingress of coolant. Arrangement for blast of compressed air during tool change should be made to keep the spindle clean.
1.6.6	The main spindle should be powered by variable, brush-less; digital controlled AC motor through gear or improved system such as integral spindle motor. The details of spindle drive should be explained. The spindle motor should be capable of delivering constant power over a wide range of spindle speed and the range of speed over which constant power/torque are available should be indicated in the offer.
1.6.7	To increase spindle life, a low-pressure air purge system should be provided. Prior to each tool change, an air blast should clean the tool taper to make sure that no swarf particle sits on the tool, therefore enhancing the rigidity of tool in the spindle The spindle should also be provided with labyrinth seal or some other suitable arrangement, which in conjunction with the compressed air should prevent the penetration of coolant/and or dirt/chips.

1.6.8	The spindle assembly should be carried out in a controlled environment. The testing of assembled spindle should be carried out for a minimum period of 16 hours as mentioned in clause 1.6.6. The firm should indicate the actual rise in spindle temperature likely to be noticed during spindle stabilization test, its methodology and duration of time.
1.6.9	Provision of through spindle coolant supply at high and low pressure shall be available.
1.7	**FEED DRIVE**
1.7.1	The machine shall be equipped with low inertia, high torque and high response digital AC servo motors to precisely drive the slides. The AC servomotor should be directly coupled to the ball screws of various axes. The make of AC servomotor should be same as that of CNC control system i.e. Sinamic drive 120S with latest version of Siemens 840 Dsl, Alfa series motors with FANUC 30i/31i/32i control system without hard disc or compatible AC servomotor with Heidenhain system. The motor should have inbuilt provision for absolute encoders. The actual make and model no. of AC servo motor for each axis should be furnished.
1.7.2	The feed movement shall be transmitted from the AC servomotor to the ball screws through a direct coupling overload safety interlock like a slip clutch or a shear pin or any other improved system. Any overloading shall immediately disconnect the drive and protect machine elements. System offered including safety features should be described in detail.
1.7.3	All the three axes i.e. X, Y, Z shall be equipped preferably with direct measuring system/ optical scales. The measurement system provided on various axes should be of reputed make as specified in clause 13.2. The firm should furnish the actual details i.e. make, resolution, accuracy and type of measuring system provided for the various axes.
1.8	**SWARF/CHIP REMOVAL SYSTEM**
1.8.1	The machine shall be provided with a suitable motor driven swarf conveyor system for collection and removal of swarf from the machine without stopping it. The chip conveyor capacity should be adequate to cater for maximum metal removal rate. There should be provision to start and stop the conveyor either by manual mode or CNC Part program through 'M-Code' functions. The chip conveyor should conform to relevant DIN/ISO specifications, which may be indicated in the offer. The firm should furnish the following details of chip conveyor.
1.8.1.1	Type and make of chip conveyor
1.8.1.2	Type of motor and its KW
1.8.1.3	Drive speed in mm/min
1.8.1.4	Height of discharge of chip conveyor from the floor level
1.8.1.5	Width of chip conveyor
1.8.1.6	Schematic layout of the system and sub-assemblies
1.9	**MEASURING PROBE SYSTEM**
1.9.1	The measuring system should consist of touch sensor probe (stylus), related software and CNC options. It shall be possible to hold the measuring probe on the tool magazine in order to make on-line measuring system. The measuring probe should be of Renishaw make and shall be capable to perform the following functions:- a) Compensation of work piece alignment by positioning of the CNC rotary table. b) Determining circle center and radius of a bore or a cylindrical component. c) Compensation of zero point measurement. d) Modification of tool compensation. e) Checking of work piece tolerance.
1.10	**COMPUTER NUMERICAL CONTROL SYSTEM**
1.10.1	AC servomotors, AC drives, PLC's and drive circuit should preferably be of the same make as that of CNC control. The direct measurement of linear movement of X, Y and Z-axis by means of feedback devices i.e. Linear optical glass scales of reputed make like SIEMENS/FANUC/Heidenhain/ Mitsubishi should be provided
1.10.2	The basic CNC system shall be full contouring control system, the standard features of which shall be described in detail in the offer. The control system (latest generation) of Fanuc 30i/32i without hard disk/Siemens 840Dsl and other of Heidenhain/ Mitsubishi make equivalent model.
1.10.3	The control cabinet should be of IP 55 or better degree of protection and of reputed make such as RITTAL, Siemens.
1.10.4	The CNC and electrical control equipment cabinet for the machine should be provided with air conditioning equipment of RITTAL, Werner Finlay, Pfannenberg make confirming to DIN 3168 or equivalent ISO specification. The air conditioning system should be equipped with

	environment friendly refrigerant. The firm should furnish the relevant details of air conditioning equipment i.e. make, maximum heat transfer rate, type of refrigerant used and number of air conditioning units provided.
1.10.5	Loading and editing of part programming should be possible through MDI/ Keyboard, RS 232 interface and USB interface/Ethernet port.
1.10.6	The control gear for electrical system should be of reputed make i.e. Siemens, Group Schneider, L&T or ABB.
1.10.7	The machine should be offered with following CNC control features:
1.10.7.1	The machine should be offered only with latest generation of Siemens 840 Dsl/ Fanuc 30i/31i/32i or Heidenhain/ Mitsubishi make equivalent model.
1.10.7.2	The system shall have 3 linear axes point-to-point positioning. Simultaneous circular interpolation in any two axes with linear interpolation in third axis should be possible.
1.10.7.3	Simultaneous linear, circular & helical interpolation in X, Y and Z-axes should be possible. High acceleration & deceleration control with automatic adaptation of contour bands with setting of tolerance setting should be available.
1.10.7.4	It should have provision of 16 bit or higher version of microprocessor based integrated type of controller. The other features are as under:
1.10.7.4.1	Flat operator Panel with 15” colored LCD/TFT screen and alphanumeric keyboard with soft keys.
1.10.7.4.2	CNC Main Memory should be 2.5 MB or higher and hard disk of 5 GB.
1.10.7.5	Canned cycle for drilling, milling, tapping with/ without compensation, reaming, boring, bore patterns, milling of slots, contour calculator, geometry calculations, parameter programming and peck drilling should be available.
1.10.7.6	Inch/metric, absolute & incremental programming should be available.
1.10.7.7	Line by line milling of plane surface through shop mill open, OEM cycles, measuring cycles, tool radius and length offset and tool wear compensation. Shop mill open with G-code programming (DIN/ISO)
1.10.7.8	The control panel should have manual over ride for spindle speeds from 50 to 120% of program value and that of feed from 0 -120 %.
1.10.7.9	Teach in mode should be available.
1.10.7.10	It should be possible to conduct dry run of the program at the time of proving out new programs.
1.10.7.11	On line and offline diagnostic features should be available. “On line” diagnostic feature will remain continuously active during operation and will check all vital machine functions and control elements. It will initiate controlled machine shut down in case of any fault and display the same on the screen.
1.10.7.12	In case of major shut down, offline diagnostics should be able to check all components of machine, CNC control elements and peripherals.
1.10.7.13	All fault messages should be displayed on line in English and in plain, simple and easy to understand language. A color code should differentiate between fatal and non-fatal errors.
1.10.7.14	Back ground editing facility should be available such that when machine is executing a CNC program in auto mode, the operator should be able to enter new programs or carry out editing.
1.10.7.15	Provision of Program repetition, co-ordinate transformation, rotation mirror scale, copy programming should be available.
1.10.7.16	Provision of Graphic simulation of the machining process, top view, representation in 3 planes. 3D representation and selective enlargement.
1.10.7.17	It should also be possible to upload/down load the CNC program through a RS 232 port, Ethernet, USB port, PCMCIA interface and DNC facility. Data transfer with PC/Laptop should also be possible.
1.10.7.18	All necessary back up should be available on spare CD-ROM and PCMCIA card.
1.10.7.19	CNC element should provide pitch error compensation, backlash compensation and thermal expansion compensation of machine elements.
1.10.7.20	Execution and PLC programs should be in F-EPROM so that power failure should not affect system execution and PLC program.
1.10.7.21	On line help key should be available to guide the operator to correct the steps in the program.
1.10.7.22	Ladder diagram / STL with cross-reference listings of PLC program should be provided /displayed on the screen of the LCD monitor for ease in maintenance of machine.
1.10.7.23	For precise adjustment of the feed rate, provision of manual pulse generator shall be

	provided.
1.10.7.24	Provision of remote diagnostic facility with telephone line for trouble shooting of machine faults should be available.
1.10.7.25	Data protection key (password protection) shall be provided. It shall prevent the program offset parameters, data etc. from being registered, modified or deleted erroneously. All the passwords shall be given to consignee during commissioning. Bidder will clarify that there is no such passwords in the machine, which has not been given to the consignee and the consignee has to approach the manufacturer for revalidation later on/at regular interval.
1.10.7.26	Siemens / Fanuc / Heidenhain/ Mitsubishi unit of the country which supplies CNC system should enter into repair & services contact with Siemens / Fanuc / Heidenhain/ Mitsubishi in India for attending the defects during commissioning, warranty period and also complete working life of the machine. Documents to provide this must be enclosed in the offer.
1.10.7.27	Any other feature, the bidder feels necessary to make the machine functioning shall be quoted under this clause along with and technical.
1.11	**FIXTURES:**
1.11.1	The firm is required to supply requisite number of fixtures for locating and holding the components for prove out listed in Annexure F for different set ups as required for carrying prove out all the operations on the components. Rationalization of fixtures may also be done to reduce the inventory. Multifunctional fixtures having capacity to holding the components two or more shall be preferred. Total number of fixtures proposed to be supplied should also be indicated in the offer.
1.11.2	Fixtures should preferably be made from case hardened or nitrided material such as 16MnCr5/90MnCrV8/20MnCr5(confirming to DIN standard or equivalent ISO standard) or equivalent material depending upon the requirement. Wherever required, jig boring operation should be done to ensure the accuracy. The value of hardness of locating/resting, surfaces should be in the range of 58+/-3 HRC
1.11.3	The final layout with detailed drawings of fixtures shall be submitted to the consignee for their perusal and comments within 8 weeks of receipt of order. The firm shall also be required to submit detailed manufacturing drawings of the fixtures along with the machine.

2.	**GENERAL ELECTRIC SPECIFICATION**		
2.1	The provision of this General Specification shall apply, wherever relevant.		
2.2	All equipments and material shall comply with appropriate Indian Standards (latest) or National Standards of the country of origin provided the latter are equivalent to or better than the former. Items for which Indian Standards are not published, National Standards shall be acceptable. The Bidder shall indicate the Standards applicable. The following standards are applicable in particular. (Corresponding International Standards like ASA, NEMA, BSS, DIN etc. may also be quoted).		
IS :	325-1979 (latest)	-	Three phase induction motors (corresponding to IEC pub-34-1) (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 :	6875 (Latest)	-	Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).
IS :	375-1963 (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 :	2516 (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. Bidder is, however, free to give alternative proposal along with justification, if in his view alternative proposal in 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.
2.3.2	AC squirrel cage, introduction motors, starting current of which is above 75 amps. if started direct on line	Star delta or Auto transformer type.
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 shall be provided for each motor. The rating of the fuse 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 -** A separate current sensitive delayed action single phasing preventor shall be provided for each motor separately. Overload protection shall not be treated as single phasing preventor.	
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.	
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 04 sets of complete electrical and electronic wiring diagrams in full details to enable the maintenance staff to locate faults in the circuits, 04 sets of part catalogues, maintenance manuals operating instructions with details of coils and windings, used in the equipment as per clause 4 in this section to facilitate repairs and maintenance should also be supplied.	
2.10	For main motor class minimum “B/F” insulation 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 solidity 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 415 V+10-20% and 50HZ+3% frequency or should provide voltage stabilizer against clause 2.13.2 of required capacity as specified below.	
2.13.2	The voltage stabilizer, if required, shall conform to :	
i)	Input Voltage -	320 to 460 volts 3 phase 4-wire unbalanced supply.
ii)	Out put Voltage -	415 volts

iii)	Regulation	-	+ 1% from No load to Full load.
iv)	Rate of correction	-	20 volts per second per phase.
v)	Wave from distortion	-	NIL
vi)	Efficiency	-	Not less than 97%.
vii)	Winding and class of insulation	-	Copper wire wound with “B” class of insulation or better.
2.13.3	In case of machine 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 conforming to Specification for voltage stabilizer as mentioned in clause 2.13.2 above and ultra isolation transformer to the parameters mentioned below. Indigenous make voltage stabilizer and ultra isolation transformer from the reputed manufacturers are acceptable.		
i)	Transformer ratio	-	1:1
ii)	Winding	-	Copper wire wound with “B” class insulation or better.
iii)	Protection	-	To arrest spikes and surges to the order of 3 KV for 200-400 micro seconds duration.
iv)	Common mode noise rejection	-	120 dB
v)	Isolation	-	Capacitance 005 Pf: resistance greater than 1000 Mega Ohms.
2.13.4	Voltage stabilizer shall be equipped with a protective relay to trip 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	**OPERATING ENVIRNMENT/ATMOSPHERIC CONDITIONS**		
2.14.1	The ambient temperature at the site at which the machine will be installed may vary from -4ºC to +50ºC 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.		
3.	**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 Mechanite 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 like beds, columns etc. 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.		
3.1.7	The machine shall be equipped with Directional Control Valve instead of Servo Proportional Control Valve.		

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 load on the machine. The meter shall have a suitable mark to indicate the maximum load the machine can take. Full details of the above and other safety features indicating how each one functions must be explained in the offer
3.3	**OPERATIONAL CONTROLS**
3.3.1	The operation of the machine shall be by push buttons 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.
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.
3.3.3	CNC Controls (where applicable) - The general requirements of CNC controls are given at Schedule-V.
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(IF APPLICABLE)**
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.
3.7.4	It should be possible to program the coolant flow through CNC program and also through manual push button.
3.7.5	The coolant tank shall be easily removable along with slurry pump from the machine for easy in cleaning of the contaminated coolant. Coolant tank should have cleaning friendly features like slant bottom, shallow pit projecting outside the machine to collect the slag/sediments etc. To ensure cleaning of the coolant tank without dismantling chip conveyor complete details of the offered system shall be explained in the bid.
3.7.6	To avoid coolant spread on floor area glass shutter should be provided.
3.8	**LUBRICATION SYSTEM (WHERE APPALICABLE)**
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 :-
a.	Specific location of points on the machine to be oiled lubricated/greased.
b.	Periodicity of lubrication of these points.
c.	Filter to be cleaned.
d.	Periodicity of cleaning filters.
e.	Periodicity of replenishing lubricating oil for the centralized system.
f.	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 will be 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.
3.8.9	Use Centralized lubrication system.
3.9	PNEUMATIC SYSTEM (WHERE APPLICABLE)
3.9.1	The compressed air supply will be provided by the customer at the machine within pressure range of 4.5-7.5 kg/cm2 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:
(a)	A pressure gauge at all places, where pressure has to be set up or inspected.
(b)	Safety valves for hydraulic circuit if relief valve does not fulfill this function.
(c)	Equipment for checking of temperature in the circuit or in the pump wherever necessary.
(d)	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.
(e)	Alarm for low oil level.
3.10.2	The sump aggregate shall have the following:
(a)	Oil level sight gauges or any other equipment showing the minimum and maximum oil levels in sump.
(b)	A drain plug at the lowest portion of the tank.
(c)	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 will be 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.
3.10.8	Use/Fitted Heater for temperature raise of hydraulic oil in winter season.
3.10.9	Chiller unit also to be used in summer to Control temperature of Hydraulic oil up to 35^{o}C.

4.	**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:
i.	Operational & Maintenance manual of the machine.

ii.	Operational & Maintenance manual of the Static voltage stabilizer.
iii.	Operational & Maintenance manual of the ultra isolation transformer.
iv.	Instruction & Maintenance manual for Hydraulic Oil Cooling Unit.
v.	User manual for Tool changer system.
vi.	Technical & Maintenance manual for Hydraulic System
vii.	Technical & Maintenance manual for Lubrication System.
viii.	Operator Guide for CNC Control System.
ix.	Programming Guide for CNC Control System.
x.	Diagnostic & Trouble shooting Guide for CNC Control System.
xi.	Start-up Guide for CNC Control System.
xii.	Machine Software Listing.
xiii.	Soft and hard copies of PLC Program in ladder form with cross reference listing and PLC project file.
xiv.	Drawings of tooling & fixtures, hard copies in A-2 size as well as soft copy in PDF format.
xv.	Wiring diagram, in which length of wires must be mentioned, hard copies in A-3 size as well as soft copy in PDF format.
xvi.	Mechanical drawings (spindle assembly, table assembly, column assembly), hard copies in A-1 size as well as soft copy in PDF format.
xvii.	Spare part manual including part lists no., hard copies in A-4 size as well as in PDF format.
xviii.	Lay out drawings in A-1 size, which clearly shows the position of all type of electrical components in machine.
xix	Technical manual of CNC, Motors, servo drives, linear scales, encoders, Power supplies and all other accessories as mounted on machine in Hard copy on bond paper in book binding as well as in soft copy in a USB Pen drive.
	Note: All manual and literature should be in English/Hindi.
4.3	**Backup:** The supplier will provide: a) Backup of machine as a ready to replace spare backup disk. b) Ghost image of backup, PLC Backup, NC Backup, HMI Backup, Software, accessories and cables for communication/data backup etc on a spare portable hard disk
5.0	**SPARES:**
5.1	Two lists of recommended perishable and non-perishable spares required for normal maintenance to cover complete range of mechanical, hydraulic and electrical equipments including controls on double shift working basis for two years should be furnished and quoted separately. The quantities should relate to, in case of non-perishable spares, to two years normal maintenance. And in case of perishable spares to the duration of its shelf life or two years whichever is less. Shelf life should be indicated with the quotation for spares. It may be noted that it is the responsibility of the bidder to ensure that exhaustive list of spares is quoted which will form part of evaluation. In case any spare other than those quoted or quantity of any spare more than that quoted in their bid is consumed, double the cost of same will be deducted from their pending bills. The WBG will be released only after clearance of the cost implication as above.
5.2	Spares shall be supplied along with the machine, if ordered.
6.0	**CONSUMABLES:**
6.1	The list of consumable spares shall be furnished and quoted along with their unit rate.
6.2	Consumables shall be supplied along with the machine or as per agreed time table, if ordered.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	**Description**	**Page No.**	**Date**
Mech/M&P/3700/3 Rev.- Nil	CNC Milling Machine	24 of 44	19/03/2024

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 clause wise deviation statement as per the format of submission of technical bid Annexure–A
8.3	Offers without clause wise compliance statement table will not be taken for evaluation.
9.0	**INSPECTION AND TESTING AT MANUFACTURER'S WORKS:**
9.1	The machine shall be inspected and tested as per QAP 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 maximum Horse Power test 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	The manufacturer shall produce invoices of bought out items/subassemblies to ensure genuineness of such products/verification by the inspecting agency.
9.6	The complete machine shall be inspected at manufacturer's premises as per approved GA drawing. Inspecting authority shall not carry out the final inspection in case GA Drawing is not approved by the consignee.
10.	**TRAINING:**
10.1	Free 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 (CNC Control & AC Drives) and CNC/PLC part programming. This training shall be provided to 04 persons (Two Mechanical and Two electrical/electronics) nominated by the consignee, for a period of 02 weeks free of cost at the RFC premises. Two weeks training will also be provided to one person free of cost from RCF/Railway Board in design and construction of the machine.
10.2	Subsequently, technical experts from the manufacturer will fully and adequately provide training to operators and maintenance staff nominated by the consignee at RCF at the time of commissioning and prove out of machine on part programming of the components for 2 weeks (as per Annexure F) to be processed on the machine.
Note:	**All training should be imparted in English/Hindi only.**
11.	**FOUNDATION & RELATED DRAWINGS**
11.1	**SUBMISSION OF GA, FOUNDATION & RELATED DRAWINGS FOR APPROVAL:**
11.1.1	For each machine, the supplier shall first submit 01 copy of foundation drawings with details of construction of foundations, complete layout of machine elements like bed, hydraulic tank, coolant tank, electrical panel, Static Voltage Stabilizer etc. and other related diagrams (Mechanical, Hydraulic, Electrical & Electronics) along with machine weight, overall dimensions, electrical load with length of 3 phase, 415 V AC electric power cable for approval as per time schedule specified in Section-I to each consignee for approval and to enable the consignee for making necessary arrangements for Installation

	& Commissioning of Machine on receipt. After getting approval from consignee, the supplier shall supply directly to each consignee 6 copies of approved GA foundation drawings and related diagrams for each machine as per time schedule specified in Section-I from the date of approval of GA drawing for information only. This information should be furnished on the pattern indicated in detail in the following IS Specifications (Latest) or relevant international standards i) IS: 2974 (Pt.I Para 4.1) for reciprocating type machine. ii) IS: 2974 (Pt.III Para 3.1) for rotary type machine (medium & high frequency). iii) IS:2974 (Pt.IV para 4.1) for rotary type machines of low frequency. iv) IS: 2974 (Pt.V para 3.1) for impact type machines other than hammers
11.1.2	**Turn-Key contracts:-** 11.1.2.1 The supplier shall arrange certification by a RCC Consultant, who should be a Chartered Engineer registered with the Institution of Engineers, that:- a) The design of the machine foundation & b) Construction of the foundation is in accordance with the latest version of the relevant part of the Indian Standard for Code of Practice for design & construction of machine foundation as specified in IS:2974. The original certificate issued by the consultant for certification of both the design & construction of the foundation and a copy of his registration certificate from the Institution of Engineers shall be submitted by the supplier to the consignee. 11.1.2.2. The supplier shall stand a warranty for the foundation along with the machine. He shall arrange to rectify any defects (e.g. sinking or cracking) occurring during the warranty period in the foundation. He shall also be responsible for uprooting and reinstalling the machine if so required for carrying out the repairs to the foundation. The warranty period would be extendable by the time period for which the machine remains out of commission due to the defect in the foundation or a period of one year, whichever is more. 11.1.2.3. The payment for the construction of the foundation and installation & Commissioning of the machine would be released only after submission of a certificate as required as per clause 12.2.3.1 above, which has to be certified by the consignee. This certification shall be done while issuing the PTC for the machine. 11.1.2.4. Detailed specifications of the quantity and quality of the material etc. of the turnkey work is to be specified by the firm along with the offer so that these can be incorporated in the contract to ensure right quality as well as quantity of the material etc
11.2	**APPROVAL OF GA DRAWING (Applicable for machines wherever delivery period is linked with approval of GA drawing)** To be governed by Time Schedule in clause 7 of Section-I and following stipulations**.**
11.2.1	General Arrangement Drawings will be sent by the 'Contractor' to the Consignee as per Time Schedule annexed in LOA/AT. Consignee will download the copy of AT from RCF website and 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 M&P/RCF, as per the Time Schedule in the LOA/AT.
11.2.2	**Delays in submission of drawings by Contractor will be 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 will be levied as per bid document. Thus the number of days delay in submission of GA drawing **plus** the number of days delay in supply of machine together will be taken as the delay in supply of machine for the purpose of calculations of LD. 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 will be subtracted from the delay in submission of GA drawings and LD will be levied accordingly**.** Delays in approval of the drawings by consignee will not be on account of Contractor, except as detailed below.
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, will be 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 RCF, 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 M&P/RCF 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 M&P/RCF 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
11.2.8	The complete machinery/plant equipment shall be suitable to the available layout. the dimensions, available for the proposed CNC milling machine is 5 m x 5m.There is no constraint for availability of space with respect to height
11.3	**DISPATCH OF THE MACHINE FROM MANUFACTURER WORKS:**
11.3.1	The supplier should normally dispatch the machine only after successful completion of third party inspection at the manufacturer's premises and the foundation has been ready for installation and commissioning of the machine on arrival.
11.3.2	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 M&P/RCF and Consignee in writing. In case of delay in readiness of site on part of consignee, M&P/RCF shall take up the matter with concerned Railway/ PU, and advise supplier accordingly
11.3.3	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 will be deemed to be proved out at manufacturer works. However the firm will prove out these components at consignee subject to the availability.
12.	**INSTALLATION, COMMISSIONING AND PROVING TESTS: (ON TURNKEY BASIS)**
12.1	**Joint Check –** The contractor or his agent 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-C shall be prepared by the consignee and the firms representative indicating the tentative time schedule for various activities of installation and commissioning. **After preparation of JRI, the material**

	should also be accounted in UDM and digitally signed Receipted Delivery Challan (if applicable), Receipt Note and RO should be issued through UDM by consignee.
12.2	**RESPONSIBILITIES OF CONSIGNEE AND BIDDER**
12.2.1	The **consignee** shall be responsible for-
i.	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
ii.	In case where construction of shed is also in the scope of contractor the consignee shall ensure site is encroachment and encumbrance free
iii.	Electricity, water and compressed air for installation and commissioning of machine shall be provided free of cost within one week of arrival of machine at site
iv.	Wherever 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
v.	Clear covered space for storage of material/equipment required for working/ construction of foundation and installation of the machine etc
vi	The consignee shall arrange the raw material for prove out at their end within 3 days of the dry run of the machine (installation, power connection, auxiliary connection like air, water connection) failing which such components will be deemed to have been proved out. The components supplied by the consignee in time will be required to be proved out within specified time schedule thereafter.
12.2.2	The bidder shall be responsible for-
i.	Design & Construction of foundation, flooring of sufficient thickness, civil works (in line with scope of supply) suiting local soil conditions at the site.
ii.	Advise consignee in time regarding schedule for requirement of clear site for construction of foundation and other infrastructure, resources & facilities required.
iii.	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.
iv.	Provision of all tools and equipment, technical and unskilled manpower, material handling accessories/ equipment and material for installation and commissioning.
v.	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.
vi.	The bidder should ensure the proper earthing for the machine and its peripherals/accessories by constructing two new separate earth pits with copper strip near machine.
vii.	The Bidder shall be responsible for meeting all the criteria set by State Pollution Control Board and Central Pollution Control Board, wherever applicable with respect to air, water, noise, land etc. The bidder shall be responsible for obtaining clearance/certificate for installation/commissioning/operation of the machine/system supplied. The consignee will provide the administrative help for establishment of communication with the Pollution Control Board.
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 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 with required material shall also be incorporated by the bidder during construction of foundation. Electrical work like laying of power/electrical cables & earthing wires from mains to machine control panel as well as within the machine, with supply of all materials shall also be carried out by the supplier.
12.4	The supplier shall demonstrate machine performance and prove out the claimed capability for successful commissioning at the consignee's works as per clause 2.4 of Section-I. 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 7 days of dry run of the machine (installation, power connection, auxiliary connections like air, water etc.) failing which such components will be deemed proved out. The components supplied by consignee in time will be required to be proved out machine within specified time schedule thereafter. Any delay in providing the "raw material or any other input" for proving out shall not be logged on supplier's account. A Joint Commissioning Note (JCN) to this effect shall be made as per the format at Annexure-D. 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 M&P/RCF. If no intimation is given to M&P/RCF and the 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 HOD user department HOD of plant department, & PCME/RCF. Based on this, decision to issue PTC will be taken by M&P/RCF, the concerned technical officer and Consignee HOD. All the pending spares, software, documents, manuals or any pending issue must be supplied/ cleared before Joint Commissioning Note (JCN).
12.5	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 or his agent 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.
12.6	The performance appraisal report/warranty discharge certificate would be issued by consignee on completion of warranty period should be prepared by the consignee and given to the firm. Copies of this performance appraisal report/warranty discharge certificate should also be sent to PCMM,PFA/RCF and CPE. On getting the performance appraisal report/warranty discharge certificate, the firm will request PCMM for release of WBG. If this report is not received within the validity of WBG, the WBG should either be extended for one year or encashed as the case may be provided under the rules
13.0	**SERVICE FACILITY IN INDIA AND TECHNICAL SUPPORT**
13.1	The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period in the appropriate section of Annexure 'A'. 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.
13.2	After the warranty period and CAMC period, if any, the manufacturer or his agent 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 commissioning of the machine at the consignee premises.
13.3	Tenderer who are OEM, shall undertake to supply spare parts for a period of expected life of machine. Other tenderers shall submit undertaking from OEM for supply of spare parts for a period of expected life of the machine.
13.4	During warranty period, the supplier or his authorized agent shall attend for break down/ any reported problem/ issue of machine as soon as possible, but in no case later than 24 hours of receipt of intimation of the breakdown.
14.	**BOUGHT OUTS**
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.
14.2	The bidder should clearly indicate that in case of components/sub-assemblies taken from reputed companies such as Vickers, Rexroth, RITTAL, THK, and Shenburger etc., 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	SIEMENS/FANUC/Heidenhain/ Mitsubishi
2	Hydraulic system	Rexroth/Vickers/Yuken/Atos/Parker
3	Feed back devices	Heidenhain, Fagor, Siemens, Fanuc, Mitsubishi
4	Ball screws	THK/INA/Tsubaki/Rexroth/Steinmeyerstar/ Gamfior / Schenburger/ Shuton.
5	Air conditioner for Control cabinet	RITTAL/Warner Finley/Kelvin
6	Spindle Bearings	FAG/SKG/Timken/NTN/KOYO
7	Lubrication System	Cenlub/Dropco/Vogel/ Rexroth
8	Electrical Control Cabinet	RITTAL/ Siemens or of other reputed make with IP55 Protection level
9	Static Voltage Stabilizer	Unity /Servomax/Consul/ Aplab/ Neelkanth
10	Ultra Isolation Transformer	Unity /Servomax/Consul/Aplab/ Neelkanth

15.0	**COLOUR:** The machine and its accessories shall be painted in Apple Green Colour No.281 to IS: 5-1978,(if any specific colour code standardized by BIS is available, the same be given). The machine can also be painted in equivalent RAL/DIN/other International Standards. If there is a standard color scheme of the manufacturer, the same can also be considered and may be specified.
16	**WARRANTY**
16.1	The machine under consideration shall be designed to have a life expectancy of 20 years. Both the structural components of the machine and its foundation shall be mandated to withstand normal operational conditions for a minimum of 20 years, safeguarding against cracks, breakages, and similar issues. Tenderers are required to submit a formal undertaking affirming their commitment to these longevity specifications.
16.2	In addition to warranty obligations as per IRS condition of contract (i.e the equipment offered should be warranted against defective design, material, workmanship etc. for a period of 30 months from the date of delivery at ultimate destination or 24 months from the date of commissioning and proving test at destination, wherever, the contract stipulates, or from the date of placement in service whichever is earlier provided defects and/or claims are notified to Contractor within 2/3 months of such date) the warranty period would also cover comprehensive preventive maintenance, which will be inclusive of all spares, material and labour cost.
16.3	All maintenance consumables like lubricants and grease except hydraulic oil / machine coolants shall form part of the scope of the preventive maintenance during the warranty. The cost of preventive maintenance to be carried out during warranty period should be quoted separately.
16.4	The payment of preventive maintenance schedule carried out during warranty period shall be made by consignee annually at the end of each year after completion of the work and issue of certificate by the consignee.
16.5	The machine shall at all times give contractual out-put and accuracy. Any deficiency or break down for a total of 01 hr. or more for a day would be treated as failure for the day, for the purpose of extending warranty period in terms of IRS condition of contract.
16.6	The tenderer shall ensure that, in case a failure is reported by a consignee, qualified service engineers shall visit the site within 24 Hours from the date of complaint on calendar day's basis. The period of 24 Hours (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 one day will be permissible for such additional failure. Complaints shall be lodged by consignee by fax, phone, e-mail, WHATSAAP MESSAGE or per bearer at address given by the tenderer.
16.7	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. Total breakdown hours shall be calculated after discounting response time and preventive maintenance period.
16.8	Maximum permissible down time till the machine is restored back to the contractual out[put and accuracy levels, in any quarter of the year during the warranty period shall be 150 Hrs to ensure this a record of breakdown (duly signed by shop in charge) in hours on quarterly bais 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 reported as per performance appraisal report. the firm will then request consignee for release of WBG annexing the performance appraisal report and the breakdown details mentioned above. Penalty will be levied on the bidder for breakdown period on working days basis (excluding holidays) after discounting for the grace period. Penalty will be calculated as percentage of annual preventive maintenance charges and will be deducted from the respective annual payments as under:

Breakdown period	**Applicable penalty**
Up to 150 hours in each quarter and not exceeding 500 hours annually	Nil
Exceeding 150 hours - up to 200 hours in any quarter and not exceeding 500 hours annually	5 % of annual preventive maintenance charges
Exceeding 500 hours - up to 750 hours annually	10% of annual preventive maintenance charges
Exceeding 750 hours - up to 1000 hours annually	25% of annual preventive maintenance charges
Exceeding 1000 hours annually	50% of annual preventive maintenance charges and 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.

	Note: -Bidders to ensure for availability of 02manpower, one is expert in the operations of CNC Milling machine and another is for the PMC and to attend the breakdown of machine immediately for 24x7 Hours during the warranty period. In the event that the aforementioned manpower should not be associated with a Railway employee, particularly an RCF (Rail Coach Factory, Kapurthala) employee, the firm is required to submit undertaking before deploying the said manpower and obtain approval of the Railway Authority for the tendered machine.
17.0	**PAYMENT TERMS & CONDITIONS**
17.1	80% of the contract value will be released after Installation, Commissioning & testing of the machine
17.2	Balance 20 % of the contract value will be released within 60 days after issue of Joint commissioning Note subject to submission of bank guarantee for an amount 10% of contract value, as warranty security & clearance of all pending issues noted in Joint Commissioning Note.

ANNEXURE-A

FORMAT FOR SUBMISSION OF TECHNICAL BID

1. a. We, M/s. ---------- offer our --------- machine, model no. ------- as per the description given in Schedule of Requirements

   b. We state that, except for the following, for which clause wise brief description and justification for deviation has been indicated, our machine fully complies with all the clauses as given in technical specification Section-I & II.

S.No.	Clause/Item	Brief description of Deviation	Justification for deviation

c. We also confirm all the schedules given in the Delivery Schedule at para 7 of Section-I.

Note1: The Bidder shall mention all technical deviation only in the format enclosed above.

Note-2 The deviation mentioned elsewhere in the bid shall not be considered and the bid shall be evaluated based on the information provided against **Annexure-A.**

Note:-3 In case tenderer offers internationally accepted alternative specifications as per clause **1.7 of Instructions to tenderer for filling technical bid.** Complete details of alternative specification apart from filling above deviation statement, may be enclosed.

2. We further certify that we are meeting the reference clause as

(A) We are the regular manufacturer of this type of machine

(B) We have made the following past supplies of similar machines as per clause _____ of special conditions during last 5 years:

S. No.	Name of the Purchaser with Address	Purchaser's Phone, Email Address, Name of the contact person	Purchase/ Supply Order number and date (along with a copy of the PO)	Quantity Supplied (with proof of supply) @	Date of Supply (@)	Date of Installation and/ or Commissioning @	parameters

@ (along with copies of relevant documents to establish linkages of documents/ entities as detailed in clause 5 of Qualifying Requirements)

(C) We are submitting following performance certificate from past users as per clause _____ of Special Conditions:

S. No.	Name of the Purchaser with Address	Purchase/ Supply Order number and date (along with a copy of the PO) (It should be the one(s) which are enlisted at clause 2 B above)	Quantity Supplied	Date of Supply	Date of Installation and/ or Commissioning	Date of issue of Performance Certificate	Performance as per Annexure-A1

3. We are having following facilities available with us or our agent for providing adequate after-sales service in India during warranty period. Complete details of after sales service, availability of technically competent engineers and warehousing facilities for spares is indicated below:

- After sales service centers:
- Availability of technically competent engineers;

- Warehousing facilities for spares

4. We have quoted for the following optional accessories as indicated under clause 4.3 of section I :

Sr No.	Description of the optional accessory	Quantity (in Nos.)	Rate (in Rest.)	Indigenous	Shelf Life (in Months)

5. We have quoted for following recommended perishable and non-perishable spares required for normal maintenance to cover complete range of mechanical, hydraulic and electrical equipments including controls on double shift working basis:

Perishable Spares

SNo.	Description of the spares	Part number	Quantity (In Nos.)	Rate (In Rs)	Shelf Life (in Months)

Non perishable spares

S.No.	Description of the spares	Part number	Quantity (In Nos.)	Rate (In Rs)

6.*We hereby confirm that we are the OEM and undertake to supply spare parts for a period of expected life of machine.

OR

*We hereby confirm that we are not the OEM, but are submitting undertaking from OEM for supply of spare parts for a period of expected life of the machine to provide maintenance spares (as and when ordered) after the expiry of the Warranty/CAMC for 5 years (life of machine - 20yrs) including the maintenance spares required for the bought out sub-assemblies and parts.

(*Strike out which ever is not applicable)

.

7. We have quoted consumables required as per clause 6.1 of Section II, in the format give below

Sr No.	Description of the consumable spares	Qty	Unit	Rate

8 It is certified that we are having suitable facilities at our works for carrying out various performance tests on the sub-assembly/assembly/machine and these shall be made available to the inspecting authority

9. **BOUGHT OUT ITEMS:** We hereby furnish a list of all critical items/ sub-assemblies which are bought out by us and proposed to be used, along with the manufacturer's name, brand model etc.

Sr No.	**Description**	**Item no.1**	**Item no. 2**	**Item no. 3**
1.	Brief description of item			
2.	Model no.			
3.	Make			

4.	Quantity/machine			
5.	Manufacturer's name and complete address			
6.	Whether imported or indigenous			
7.	Country of origin			

10.Details of preventive maintenance services including cleaning of machine to be provided under PMC during warranty and CAMC is given in the following format. (The information shall be provided whether Preventive Maintenance/ CAMC is in scope or not)

S.No.	TYPE OF PREVENTIVE SCHEDULE	PERIODICITY	ITEMS TO BE CHECKED	ITEMS OF REPLACEMENT	EXPECTED PLANT DOWN TIME

11. We further submit the following information about the offered machine as per the technical specification section III and Important Features of the tender section I. We understand that any omission of any of the below mentioned information will render our offer incomplete to that extent.

<table>
<tr><th>S.N.</th><th>Clause No.</th><th>Information required</th><th>Value /Write up/Brochure</th></tr>
<tr><td colspan="4">Section-I</td></tr>
<tr><td>1.</td><td colspan="2">The information against leading parameters (For each schedules to be filled by bidders separately) is as under:
Schedule-I of Section-I Major Parameters
<table>
<tr><th>Clause no. of Section-I</th><th>Item Description</th><th>As specified</th><th>Value/ Write up/ Brochure (As offered)</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
Schedule-I of Section-I Other Parameters
<table>
<tr><th>Clause no. of Section-I</th><th>Item Description</th><th>As specified</th><th>Value/ Write up/ Brochure (As offered)</th><th>Justification for Deviation offered (if any)</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>Values</td></tr>
<tr><td>2.</td><td>2.3.1 of Section I</td><td>Indicate the Standard to which the machine conforms. Detailed of Sample test charts for the same, clearly showing the accuracies to be achieved on the machines already supplied</td><td>Write-up</td></tr>
<tr><td>3.</td><td>2.3.3.2 of Section I</td><td>Details of Full load or maximum HP cutting test</td><td>Write-up</td></tr>
<tr><td>4.</td><td>2.3.3.5 of Section I</td><td>Spindle stabilization test for 16 hours (minimum duration) - Actual test scheme</td><td>Write-up</td></tr>
</table>

5.	2.4 of Section I	The floor-to-floor timings of components mentioned in Annexure-F with break up of timings for bare machining, clamping/ unclamping, set up change, gauging and inspection etc. The basis of arriving at such timings i.e. speed, feed, number of roughing and finishing cuts, tools used, number of set ups, estimated timings of each element of operation, depth of cut, number of passes, any other data considered as relevant should be furnished for each operation.	Write-up
6	3.7.1 of Section II	Coolant System • Size of coolant tank, • Make • Max. pressure developed • Flow rate for internal/external coolant • Safety for table bearings • Nos. of safety/interlocks provided against insufficient flow of coolant • Filter size (if used)	Values & write up
7	3.8.1 of Section II	Details of lubrication system • Make of lubrication motor & pump • No. of lubrication points • Tank Capacity • Motor power in KW • Filter size (if used) • Nos. & details of safety devices.	Values & Write-Up
8.	3.10.3 of Section II	Capacity of refrigeration type oil cooling system.(if provided) • No. of units • Make • Maximum heat transfer rate • Type of refrigerant used • Nos. of temperature sensing probes	Values & write up
9.	3.10.8 of Section II	Hydraulic system • Size of hydraulic tank, • Make • Max. pressure developed • Nos. of safety/interlocks provided against insufficient flow of hydraulic oil	3 Values & 1 Write-Up
10.	2.0 of Section II	**Technical Details/Particulars of Motors, Control Gears, Voltage Stabilizer & Isolation Transformer**	values
11.1	2.0 of Section II	**A.C. Servo & other AC Motors and Control Gears** • **AC SERVO & OTHER AC MOTORS** • Manufacturer's Name • Type of enclosure • Type of duty (Ref. IS: 325) (Latest) • Rating-Continuous/intermittent • Output (KW/BHP) • AC voltage across phases, number of phases & frequency. • Speed in RPM • Class of insulation • Normal full load current • Starting current • Maximum current at the time of change over from lower speed to higher speed • Type of motor-Squirrel cage/slipring (wound rotor) • Temperature rise of windings and other parts allowed above an ambient temperature of 50 degree C. • Frame size of motor • End use of motor	

		• **CONOTROL GEARS** • Manufacturer's Name • Type of control gear (Direct on line/Star Delta/Auto-transformer etc.) • Rating of starting gear in KW & amps. • Short circuit protection (y/n) ▪ No volt trip (y/n) ▪ Overload trip (y/n) ▪ Delayed action current sensitive single phasing preventor (y/n) ▪ Standard specifications to which the motor control gear and its ancillary offered conform to	
11.2	2.0 of Section II	**D.C. Motors and Control Gears** • **DC MOTOR** • Manufacturer's Name • Type of enclosure • Type of duty (Ref. IS: 4722) (Latest) • Rating-Continuous/intermittent • Output (KW/BHP) • DC voltage across phases, number of phases & frequency • Method of excitation whether shunts, series, compound or separately excited, if separately excited state excitation voltage. • Speed in RPM • Class of insulation • Normal full load current in amps. • Starting current • Temperature rise of windings and other parts allowed above an ambient temperature of 50 degree C. • Frame size of motor • End use of motor **CONTROL GEARS** • Manufacturer's Name • Type of control gear (Direct on line/Resistance type/Thyristor type) • Rating of starting gear in KW & amps. • Short circuit protection (Y/N) • No volt trip (y/n) • Overload trip (y/n) • Standard specifications to which the motor control gear and its ancillary offered conform to • Standard specification to which control gear conforms to	Values
11.3	2.0 of Section II	Voltage Stabilizer & Ultra Isolation Transformer **VOLTAGE STABILISER** • Manufacturer's Name • Type of voltage stabilizer : a) DC servo motor type b) AC servo motor type c) Solid state • Rated capacity in KVA • Nos. of phases & frequency • Type of input supply unbalanced • Input voltage	Values

		• Output voltage • Rate of correction • Class of insulation & winding (only copper wound is acceptable) • Type of control circuitry • Class of duty • Type of cooling • Indicating instruments and their ranges • Safety features **ULTRA ISOLATION TRANSFORMER** • Manufacturer's Name • Rated capacity • Ratio of input/output voltage • Class of insulation • Arrangement for suppression of power line surges, spikes, transients and noises • Type for cooling.	
12.	Misc.	• Total weight of the machine. • Total connected electrical load and its break up. • Details of quoted machine like brand name, model etc. • Total working area • Maximum floor area required for installation and commissioning of the machine. • Facilities required during commissioning of the machine • Maximum size of packing and no. of packages	Values
13.	Misc.	Dimensions (lxbxh) & weight of the major sub assemblies: • Bed • Column • Saddle • Table • Headstock	Values
14.	Section - I	**Clause wise comments/details as required**	Complied/Non Complied
15.	Section - II	**Clause wise comments/details as required**	Complied/Non Complied

Signature of the authorized representative of the bidder with company stamp

Annexure-A1 (Certificate of Performance)

Important Note*: i) The certificate shall not be older than one year from the original date of closing of tender. The performance certificate issued after original date of closing of tender (in cases where tender closing date has been extended) are also acceptable however the machine must have completed one year of satisfactory working after date of commissioning as on original date of closing of tender.*
ii) Performance certificate shall contain following information.

Letter Head of issuing authority

(See Important Note above) Date of issuance:
TO WHOMSOEVER IT MAY CONCERN

S.N	Head	Details
1	Name of the Supplier	
2	Name of End User	
3	Name of the machine/description of machine	
4	Purchase/Supply Order Number	
5	Date of Purchase/Supply Order	
6	Date of Supply of machine(s)	
7	Quantity supplied	
8	Manufacturer's Serial Number**(s)** of machine(s) or Plant/system etc. number (or some mode to identify the machine) (Optional)	
9	Date of Commissioning (Give individual date for each machine)	
10	Performance of the machine	Satisfactory/unsatisfactory
11	Any other information which user intends to append, for example a) aspects bringing out similar nature of machine, b) major/leading parameters of the machine.	

Name & Designation
Contact Number
Signature of the issuing authority
Email id
(Seal of the Organisation)

ANNEXURE-B

FORMAT FOR INDEMNITY BOND

This deed of Indemnity executed by M/s. ---------- hereinafter referred to as Indemnifier' which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representative and assignees in favour of FA & CAO, Rail Coach Factory, Kapurthala, Punjab, India, hereinafter referred to as the 'Indemnified' which expression shall unless repugnant to the context or meaning thereof, include its successors and assignees witnesses as to.

Whereas the Indemnifier herein had participated in a global tender for the supply of ---------- (machine name) which is opened on ---------- (date) on terms and conditions set out inter-alia in the Tender Document.

And whereas, clause of the above mentioned tender document described that the machine shall be designed for a life of 20 years with regular maintenance and all the structural members of the machine and its foundation should be guaranteed for 20 years against cracks, breakages etc. during the course of normal operations from the date of commissioning whichever is earlier of the stores supplied by the Indemnifier to the indemnified.

The indemnifier hereby irrevocably agrees to indemnify the indemnified that in the event of the said machine not achieving the life guarantee, the indemnifier shall as may be deemed necessary repair the defective machine at site, free of cost, within a reasonable time specified by the indemnified or reimburse the pro-rata cost of the machine to the extent a life not achieved as per the guarantee, or supply a spare stores for the defective portion only free of cost at site.

Bidder's authorized signatory
With seal

Station:

Date:

Witness: 1.----------
(Signature with Name, Designation & Address)

2. ----------
(Signature with Name, Designation & Address)

ANNEXURE-C

JOINT RECEIPT INSPECTION NOTE

Note: *With the issue of JRI, the payment is released to the contractor as per the terms of Contract. The consignee shall satisfy themselves that the conditions of contract are met before the issue of JRI.*

Date……..

Sub: Receipt of consignment for machine…….
Ref: RCF Contract No…….

1.	Name of consignee/Railway	
2.	Machine name	
3.	Quantity	
4.	Name of supplier	
5.	Consignment of the machine received on	
6.	The foundation & associated works essential for "Safe Installation of Machine" are ready (for turnkey contracts only) *****	

** If there are Delays on account of Consignee such as clear site is not given, then the condition 6 will not be a valid ground for holding JRI.*

It is certified that the consignment of the machine has been received complete and in good condition as per specification shown in the contract.

Tentative plan for installation and commissioning of the machine is as under:

1.	Date of clear site provided	
2.	Contract	Turnkey/Non-turnkey
3.	**Status of readiness of foundation:**	
3(a)	Already constructed on	
3(b)	Under construction & likely date of its completion	
3(c)	Construction yet to be started from ……. and likely date of its completion	
4.	Status of availability of electrical power, water and compressed air etc.	Available/Not-available
5.	Number of components to be proved out on the machine	
6.	Likely date for start of erection/installation	
7.	Likely date for switch-on the machine	
8.	Likely date of completion of commissioning of the machine	

Representative of firm
Designation

Representative of consignee
Designation (Minimum Gazetted level)

ANNEXURE-D

JOINT COMMISSIONING NOTE

Date:……

Sub: Commissioning of (name of machine)…….

Ref: RCF AT No…….

1.	Name of consignee/Railway	
2.	Machine name	
3.	Quantity	
4.	Name of supplier	
5.	Machine received on	

1. All the parameters of the machine are found okay. The proving test on the machine was conducted from …… to …….. and machine is working satisfactorily.

2. Machine has finally been commissioned on…….. . The machine has been handed over for regular use and kept under one month observation to watch its performance.

3. Following minor deficiencies (if any) found during joint observation trials are to be attended/rectified by the firm during one month observation and before issuing the PTC for the machine:

a.

b.

c.

Representative of firm
Designation

Representative of consignee
Designation
(Minimum Gazetted level)

ANNEXURE-E OF SECTION III

PERFORMANCE APPRAISAL FORM

APPRAISAL ON COMPLETION OF WARRANTY PERIOD

Dated:……

To, M/s. ……

1.	RCF AT No.	
2.	Consignee/Railway	
3.	Name of supplier	
4.	Machine Name	
5.	Machine received on	
6.	Machine commissioned on	
7.	PTC issued on	
8.	Warranty period expired on	
9.	**Performance during warranty period:**	
9(a)	Total number of breakdowns	
9(b)	Total downtime in number of days	
10(a)	Any warranty complaint pending on date	Yes/No
10(b)	If yes, then the date and nature of defect(s)	

In case, Warranty clause No.16 of the machine during warranty period is also given in Bid Document Pt. II, then following details of breakdown hours for preceding eight quarters may also be furnished.

Quarter	**Period** **From -------To--------**	**Breakdown hours**
1		
to		
8		

Signature----------
Name----------

Designation: DY.CME
Office Stamp

1. COS/RCF/Kapurthala-144602

2. CPE/RCF/Kapurthala-144602

3. FA&CAO/RCF

Note:

i.)This appraisal may please be sent immediately on completion of warranty period. If any extension of warranty period required, may please also be mentioned with details.

ii) Sr. Scale Officer having independent charge is also authorized to sign.

ANNEXURE – F OF SECTION III

LIST OF COMPONENTS TO BE PROVED OUT

The following Components should be formed on the machine:

S. No.	Description of Component	Drawing No.	Remarks
1.	Punch for shearing DIE of Trough Floor on CRF Machine	XP000409	
2.	Exit DIE Block Shearing DIE of Trough Floor on CRF Machine	XP000410	
3.	Punch and DIE for Angle Drg. No. AE16271 on 160 Ton Eccentric Machine	XP005601	
4.	Punch and DIE on LVD 800 T Press Brake for LHB Roof Sheet	XB015901'a'	Item no. 7 & 8
5.	Top Clamp Assembly	XW016030	Item no. 4 & 6
6.	Spring Pot Guide	XW027717	Item no. 1 & 2
7.	Clamp of Welding Jig for roof beam of LHB Coaches	XW022003	Item no. 1 & 3

Note:

I. If the production falls short by 2 percent, a penalty of 2 percent will be applied. In the event of a production deficit of up to 5 percent a penalty of 5 percent will be applied. If the production shortfall exceeds 5 percent, the machine will be deemed rejected.

II. Prove out components /Assembly are based on the RCF current production rate/output per half shift. If any components is not available at the time of commissioning than any other suitable components/ assembly from the revised production programme may be taken

ANNEXURE-G

QUALITY ASSURANCE PLAN

MACHINE DESCRIPTION

Category	S. No.	Component/ Process	Sample Size	Type Of Check	Quality record	TYPE OF CHECK	REMARKS
Bought Out Raw Material		Steel plates, rods etc	1 Sample / Size	Chemical & Mech.	TC & INV.	V	
Bought Out Components		Bearings	100%	Visual	Inv	V	
		Electric motors	100%	Review of TC	TC & INV	V	
		Hydraulic Pumps , Air cooler pump, Dies, Jaws, machine lamps, Voltage stabilizer, Isolation transformer, Panel AC, operating& maintenance tools, controllers,	100%	Review of TC	TC & INV	V	
Fabrication & sub assemblies		Weld joints	100 %	RT	IR	V	
		Table Hardness	100%	Hardness	IIR	V	
		Heat Treatment	100%	Review of Inv.	IIR	V	
		Castings	100%	Visual	IIR	V	
		surface finish of components	Random	Surface	IR	V	
Final Inspecti on		Inspection of machine in complete as per specification	100%	Visual & Load test	IR	CHP	
		Noise level	100 %	Sound	IR	CHP	
		Temperature rise of Hydraulic	100 %	Measurement	IR	CHP	
		Structures Geometry alignment,	100%	Relevant international ISO/DIN/IS/JIS standard	IR	CHP	

INV - Invoice
TC – Test Certificate
V – Verification
CHP – Customer Hold Point
IIR – Internal Inspection Report
IR – Inspection Report

ANNEXURE-H

PROFORMA FOR ASSESSING MANUFACTURING CAPABILITY OF THE OEM TO MANUFACTURE CNC MILLING MACHINE

Tender No. ..... Date of Opening.....

1. **NAME OF THE OEM/ BIDDER**
2. **LOCATION & ADDRESS**

Postal Address

i) Head Office

ii) Works/Factory

Telephone No. (with STD code)/ Mobile Number

i) Regd. Office

ii) Works/Factory

3. **DESCRIPTION OF FACTORY/WORKS**

i) Total Land area (in Sq. meters)

ii) Total covered area(in Sq. meters)

iii) Different Sub-units (with details of covered/uncovered area, etc.)

iv) Special features, if any:

4. **NO. OF PERSONNEL EMPLOYED (CATEGORY-WISE)**

i) Managerial*

ii) Supervisory*

iii) Skilled artisans

iv) Unskilled

* The qualification may also be indicated.

5. **GENERAL INFORMATION- TECHNICAL**

Description of different departments in the Factory/Works along with an organization chart

Detailed description of machinery and plant in each department (make and year of procurement).

For special type of equipment /machinery, copy of pamphlet/ write-up to be furnished to support the description.

Details of raw-materials held in stock (state whether imported/indigenous).

Production capacity of the quoted items

i) Per month

ii) Per year

List of other items, which the firm regularly manufactures and corresponding production capacity.

6. **DESIGN CAPABILITY**

Details of Qualified Personnel (indicating qualification and experience)other facilities available.

7. **MANUFACTURING PROCESS**

Level of in-house facilities

Important items for which work done by outside vendors.

Brief details of manufacturing process relevant to the items quoted.

8. **QUALITY ASSURANCE**

Does the factory have an established Quality Assurance Programme? If yes, please enclose a copy of the write up? If not, what plans are there if any for setting it up?

Details of Quality Assurance Organization.

Quality Control Testing Facilities and Laboratory equipment available. In-house facilities available for inspection and QC.

Availability of gauges (details to be furnished)

9. **AFTER-SALES-SERVICE**

Facilities available at works and branch offices/ authorized service centres/ service delivery partners.

Signature.....