Annexure-1

SUPPLY, INSTALLATION & COMMISSIONING OF 5-AXIS CNC VERTICAL MACHINING CENTER WITH ROTARY MILL-TURN TABLE
TECHNICAL SPECIFICATIONS AND TERMS & CONDITIONS

Sl.No	Description	Specifications/Details
1.00	**SCOPE**	
	Supply, installation, commissioning, training and prove-out of a 5-axis CNC Vertical Mill-Turn Centre with a swivel Universal Fork Head for both Milling & turning application with a dedicated turning equipment mountable on Milling Head. The proposed machine is intended for high precision milling of complex configured aerospace components at different orientations up to size of 2.5m as well as turning operation of rings up to size of diameter 3 m in a single clamping. This machine essentially should have three linear axis X,Y,Z with and Universal Milling Head (A and C Axis) as 4th & 5th Axis along with continuous interpolated MILL-TURN rotary table (C1 axis) Detailed technical specifications as follows :	
2.00	**MACHINE DESCRIPTION**	
2.01	This machine shall have an over head moving gantry on raised twin column with 5 axis movement. The machine shall be equipped with a fixed Rotary table, also functioning as a controlled sixth axis, with high-precision Direct Drive technology, which enables both milling operations with up to 6 interpolated axes . The Mill-Turn table consists of a supporting structure which is fixed to the foundation. 5-axis CNC Vertical Mill-Turn Centre consisting of three linear axis X,Y,Z and Universal fork Milling Head as 4th & 5th Axis with continuous MILL -TURN rotary table and machine is intended for doing both turning and milling of aerospace materials in a single setup. Machine shall have absolute Linear scale feedback for X, Y & Z Axes with optical scales. NC Mill-Turn Rotary table should also have direct absolute angular measuring system. Digitally controlled Direct Drive motor with efficient inbuilt cooling system. Turning capability must be provided with a dedicated Turning head mountable on Milling Head but independent from the milling spindle. The machine should have following features :	Bidder/Tenderer to confirm
2.01.01	Working of all 5 axes simultaneously along with interpolated rotary mill turn rotary table	Bidder/Tenderer to confirm

2.01.02	Machining Mode shall be Milling & Turning. This machine shall be capable of 5 sided and 5 axes simultaneous machining operations like milling, drilling, tapping (both rigid and floating), reaming, contouring, (rough & finish) boring and turning in the single setup.	Bidder/Tenderer to confirm
2.01.03	Cooling unit for spindle feed drive rotary axis and NC Mill-turn table and electrical cabinet must be provided.	Bidder/Tenderer to confirm and submit details
2.01.04	Speed - torque characteristics(Milling spindle and mill Turn table spindle) capable of machining mainly aerospace grade Aluminium Alloys and also fininsh machining on steel, stainless steel.	Bidder/Tenderer to confirm and submit Speed- torque characterstics/ chart for the offered Milling spindle motor and mill Turn table spindle motor
2.01.05	CNC controller : SIEMENS SINUMERIK ONE with latest version	Bidder/Tenderer to confirm
3.00	**MACHINE CONSTRUCTION**	
3.01	Machine should have a rigid construction Overhead Gantry/bridge design. Machine major part Turn Table, Column, bridge, milling head must be made out of cast iron or in electro-welded and stabilized steel. Bidder/Tenderer to submit machine constructional details. The machine structure shall be sufficiently stress relived and aged to ensure dimensional stability and freedom from distortion over entire life of the machine, have vibration damping characteristics and adequately ribbed to provide maximum stiffness. Machine shall have following features:	Bidder/Tenderer to confirm
3.02	Machine bridge must be made out of cast iron or in electro-welded and stabilized structure. Details to be submitted	Bidder/Tenderer to confirm
3.03	Stop block with 3-point support adaption to receive/use angular milling head with support cleaning by blowing air .	Bidder/Tenderer to confirm
3.04	Air Pressure cleaning cycle for blowing the spindle cavity for each tool change shall be provided.	Bidder/Tenderer to confirm
3.05	Linear Motion Guideways (Roller driven) of reputed International manufacturer for X,Y,Z Axes to be provided.	Bidder/Tenderer to confirm
3.06	Operation of flood cooling / jet cooling / through cooling shall be programmable as well as manually initiated at any time in the machining cycle	Bidder/Tenderer to confirm
4.00	**MACHINE DETAILS**	
4.01	Bidder shall clearly specify Make and Model of the machine	Bidder/Tenderer to specify and mention
4.02	Standard catalogues of the offered machine shall be enclosed	Bidder/Tenderer to submit
4.03	Country of origin of the offered machine shall be exclusively specified	Bidder/Tenderer to specify and mention
5.00	**MACHINE CAPACITY**	
5.01	Longitudinal travel (X axis)	2500 mm or more
5.02	Transversal travel (Y axis)	2500 mm or more
5.03	RAM Vertical travel (Z axis)	1100 mm or more
5.04	Mill Turn table Diameter	2500 mm or more
5.05	Maximum Turning diameter	3000 mm

5.06	Shoulder to shoulder Gap	3500mm or more
5.07	Door Opening from front	2.8 m or more
5.08	Roof Bellow Opening from top side	3.2 m or more
5.09	Cutting feed rate for X-axis	20 m/min or more
5.10	Cutting feed rate for Y-axis	20 m/min or more
5.11	Cutting feed rate for Z-axis	15 m/min or more
5.12	Distance between spindle face and table top surface (Head Vertical Position)	70 mm to 100 mm
5.13	Diistance between spindle Center and table top surface (Head Horizontal Position)	400 mm to 430 mm
6.00	**FEEDS**	
6.01	Rapid traverse for linear axes (X/Y/Z)	50/50/40 m/min or more
6.02	Acceleration on All Linear axis	5 m/s2 or more
6.03	Rapid speed of A-Axis	30 rpm or more
6.04	Rapid speed of C-Axis	30 rpm or more
7.00	**MACHINE ACCURACIES (As per VDI/DGQ 3441)**	
7.01	Positioning uncertainty (P) of all linear axes (X, Y & Z)	X- 0.015, Y- 0.015, Z- 0.010 mm or better
7.02	Positioning uncertainty (P) of rotary axes (A,C & C1)	0.002 degree or better
7.03	Bidder shall submit documentary proof for positional accuracies for offered machine model i.e. laser test report of supplied machine/s in recent past of offered machine model	Bidder/Tenderer to provide
7.04	Geometric Accuracies	As per ISO 10791 or equivalent international standard. Bidder shall submit documentary proof for geometrical accuracies for offered machine model supplied recently
8.00	**MILLING HEAD & TURNING ATTACHMENT**	
8.01	Integrated Universal fork Milling Head with NC controlled A & C axis for 5 axis simultaneous machining	Bidder/Tenderer to confirm with clear specifications
8.02	Simultaneous CNC programmable and shall be equipped with hydro-mechanically operated rigid tool clamping system.	Bidder/Tenderer to confirm
8.03	Milling head shall be programmable and activated via CNC control	Bidder/Tenderer to confirm
8.04	Turning head shall be designed for automatic quick change, connected to the Milling Head by means of an automatic clamping system and precision references. The head, equipped with an automatic clamping unit for CAPTO C6 or similar shall contain all the necessary controls for tool changing and the conduits for coolant for precise clamping. Turning Head should not be clamped on the Milling spinlde taper.	Bidder/Tenderer to confirm
8.05	Details of Pick-up and storage station for Turning head	Bidder/Tenderer to provide
8.06	A axis Travel	-100° / +120° (Total angle shall not be less than 220degree).
8.07	Increment	0.001 degree or better
8.08	Rapid feed A-axis	30 rpm or more
8.09	C-axis Travel	-300° / +300°

8.1O	Increment	0.001 degree or better
8.11	Rapid feed C-axis	30 rpm or more
9.00	**MAIN SPINDLE**	
9.01	Spindle type and Make	Integral motor spindle with reputed make (Cytec/Kessler/GNM/Steptech/Seimens)only. Provide details
9.02	Spindle drive elements	Siemens make Digitally controlled AC servo motor
9.03	Spindle Nose taper	HSK A 63
9.04	Tool clamping	Hydro-mechanical. Provide details of the mechanism
9.05	Spindle speed range	0-16000rpm(min.), infinitely variable
9.06	Spindle Motor power at 100% Duty Cycle (S1)	40 kW or more
9.07	Spindle Motor power at 40% Duty Cycle	Specify
9.08	Spindle torque at 100% Duty Cycle (S1)	150 Nm or more
9.09	Spindle torque at 40% Duty Cycle (S6)	180 Nm or more
9.10	Holding torque with continuous machining	1500 Nm or more
9.11	Clamping force	50kN or more
9.12	Spindle bearing inside diameter of front bearing	100 mm or more
9.13	Spindle nose cleaning before tool clamping	Required by compressed air. Provide details
9.14	Runout at 20 mm distance from spindle face (Test Mandrel)	0.005 mm or better
9.15	Runout at 300 mm distance from spindle face (Test Mandrel)	0.010 mm or better
9.16	Dynamic balancing	Required. Please give details and certificate
9.17	Spindle cooling	Required. Please give details
10.00	**MILL TURN TABLE**	
10.01	Mill Turn table Diameter	2500 mm or more
10.02	Job carrying capacity	8000 kg or more
10.03	Power For Turning at S1 (100% DC)/S6	50/52 kW or more
10.04	Torque at S1(100% DC)/S6	6000/9000 Nm or more
10.05	Rotary table Speed	180 rpm or more
10.07	Position Accuracy degree (P)	0.002 degree or better
10.08	Center Bore (in mm)	Vendor shall specify
10.09	T -Slot size for clamping of work.	Please give details
10.10	Minimum 6 nos of Radial slots (equispaced) for Turning and 6 nos of Parallel slots (equispaced) for milling to be provided.	Bidder/Tenderer to confirm
10.11	4 nos of manual Jaw to be provided for Turning	Bidder/Tenderer to confirm
10.12	Axial runout at 2.5 m diameter	0.03 mm or less
10.13	Runout at center bore	0.015 mm or less
11.00	**AXES & DRIVES**	
11.01	Linear Axes motors	Digitally controlled 3-phase AC servo motor. Provide details of drive motor type and model
11.02	Drive capability	Performance shall meet high dynamic requirements.

11.03	Drive elements (for all linear axes)	X axis movement: Master X1 drive and slave X2 drive synchronized. X and Y axis driven by Siemens AC brushless servo motor and linear movement by rack and double pinion/precision gear box with electronic preload for backlash recovery preloaded to avoid backlash. Z- axis movement shall be driven by Siemens AC brushless servo motor and linear movement by double ball screw each with double nut preloaded to avoid backlash .
11.04	Linear guideways	The X1, X2 axis upper gantry shall move over the rigid 2 nos. of LM rail (roller guide ways) with minimum 4 LM blocks on each shoulder. (Size 45 or more) The Y axis gantry shall move over the rigid 2 LM rail (roller guide ways) with minimum 4 LM block. (Size 55 or more) The Z- axis shall move over the rigid 2 LM rail (roller guide ways) with minimum 4 LM block. (Size 55 or more)
11.05	Z-axis braking to avoid digging of tools during power failure	By double ball screw each with an electromechanical safety brake system.
11.06	Rotary axis motors (A and C)	**Direct Drive.** Provide details of drive motor type, make, model etc.
11.07	Drive capability	Performance shall meet high dynamic requirements.
11.08	Drive elements (for MillTurn Table)	Milling and turning table shall also function as a controlled sixth axis. MillTurn table shall be driven by powerful, high-precision **Direct Drive** technology, which should control both milling operations with up to 6 interpolated axes and the turning of parts. The table Shall have hydraulic brake to block the chuck in any position. Drives shall be thermally stabilized by electro-refrigerator. Direct reading of the table position is by means of encoders with micrometric resolution
11.09	Guideways system (for MillTurn Table)	The Turn table shall rotate via a special combined hight precision axial/radial roller bearing.
12.00	**FEEDBACK SYSTEM**	
12.01	Type	Closed loop feedback
12.02	Feedback system for all linear axes	Hiedenhain make, Linear Optical absolute scale for all linear axes and abosolute encoder for rotary and swivel must be provided. Full technical details of make shall be provided
12.03	Resolution of linear scale	0.01 µm (measuring step)
12.04	Feedback system for all Rotary axes	Hiedenhain make, Absolute Encoder
12.05	Resolution of Rotary Encoders	“A” +/-2 arcsec “C” +/-3 arcsec
13.00	**CNC CONTROL SYSTEM**	

13.01	CNC controller	CNC control system shall be NCU1760 and software for Sinumerik one SW version 6.14 or latest and with SINAMICS S120 or latest drives, With MDynamics 5-axis package for implementing simultaneous 5-axis functionality. Vendor has to offer and enable any option that is necessary for implementation of 5-axis simultaneous interpolation.. All messages and menu text shall be in English language.Provide catalogues for offered model.
13.02	Essential Module	Additional 2 MB CNC user memory in NCU Software (D01,D02), Additional axis/spindle (A01..A0n),Additional positioning/auxiliary/spindle (B0x),Gantry axis (M02), Safety Integrated – F –PLC (S60), Safety Integrated axis (K00), Synchronized actions stage 2 (M36), Cross-mode actions (ASUB and synchronized actions) (M43), Sag compensation Multi-dimensional (M55), Master-Slave for drives (M03), SINUMERIK Operate/NCU (S00),SINUMERIK Integrate Run MyScreens Software (P64),Portfolio for high surface quality and productivity (S33), Machining package 5 axes (M30), 3D tool radius compensation (M48),Spline interpolation (A, B and C splines-S16), Advanced Surface (S07),HMI user memory additionally on memory card of the NCU (P12),Measuring cycles for drilling/milling and turning (P28),Measure kinematics (P18),TRANSMIT/cylinder surface transformation (M27),Portfolio for high surface quality and productivity (S33),Shop Turn / ShopMill (P17),Residual material detection and machining for contour pockets and stock removal (P13),3D simulation 1 (finished part) (P25),Simultaneous recording (real-time simulation of the current machining operation) (P22),SINUMERIK Integrate Run MyCC /VCS-rot Compensation in space for 2 rotary axes (N31), Protect MyMachine /3D Primitive MCS31403 (S03),top speed plus, Top surface, friction compensation ADT, collision avd eco
13.04	Programmable axes	X,Y,Z,A,C and C1
13.05	Simultaneous interpolable axes	All axes as per clause number 13.04
13.06	Hardware	CNC, PLC & Operating console should be of latest version. Provide details and catalogues for offered models
13.07	NC Memory	10 MB or more
13.08	Panel air conditioning	Required
13.09	Panel wiring	Should conform to CE norms
13.10	Operator panel	High quality ergonomically designed and fitted with integrated keyboard & safety buttons for ease of job loading, programming and operations with IP54 protection.
	PROGRAMMING & CONTROL FEATURES	
13.11	Display	High resolution 21" or higher Multi touch colour monitor with QWERTY keyboard and dynamic graphic display in English language
13.12	Graphic simulations	2D and 3D graphic display and simulation on XY, XZ and YZ planes
13.13	Metric & inch input	Required

13.14	Linear, circular, Helical & NURBS interpolation	Required
13.15	Least input increment-Linear	0.001mm or better
13.16	Least input increment-Angular	0.001 ^{o} or better
13.17	Block processing time	<0.6ms
13.18	Calculator function	Required
13.19	Look-ahead feature	Required
13.20	Compensations: Cutter radius & length compensations, pitch error, backlash etc.	Required
13.21	Absolute & Incremental programming	Required
13.22	Programming mode	ISO programming in metric and inches, interactive programming and support for JOG, TEACH-IN & MDI programming modes
13.23	Parametric programming	Required
13.24	Background editing & programming	Required
13.25	Program repetition, co-ordinate transformation, scaling, rotation, mirror & copy capabilities	Required
13.26	All essential 6-axis transformation functions shall be available & activated in the control system and configured for effecting simultenous interploation motions	Required
13.27	5 axis kinematic correction/ calibration cycle	Required
13.28	Machine status in real time should be possible with features like Visualization of machine condition (spindle load, etc.) and Displaying job information with quantity, lot size and term to maturity , Maintenance messages and warnings, Drive-related energy return feed display based on main supply Energy recuperation display	Required
13.29	Machine Protection Control to be provided for Preventive protection by vibration sensor) at the spindle, Machine protection by quick shutdown & Variable Tool- and Process-specific shut down limit, Process control with bar display in the machine control ,	Required
13.30	Standard Canned cycles offered by CNC control sytems (Drilling, Milling, rigid tapping, reaming, boring, Thread milling etc.)	Required
13.31	Alarm & Error diagnostic feature	Required
13.32	Number of part programs / work pieces in memory	750 (with EES unlimited) (min)
13.33	External interface	Ethernet, USB ports on operator panel
13.34	Speed and feed override rotary switches on operator panel	Required. Provide details
13.35	Automatic repositioning after cycle interruption	Required
13.36	Decimal point programming	Required

13.37	OEM Cycles such as Drill- and mill cycles, geometry calculation, tapping with/without compensation chuck, reaming, boring, bore patterns, slot milling, rectangular and circular pockets, line by line milling of plane surfaces with JobShop manufacturer cycles & Rest material detection/machining for contour pockets	Required
13.38	Block search & skip	Required
13.39	Display of remaining cycle during execution of repetitive cycle/sub routine	Required
13.40	Multi program storage with program identification	Required
13.41	Tool management for tool life monitoring	Required. Provide details
13.42	Turning cycles/preconditions: turning axis programming like the spindle, registration unbalanced state, constant cutting speed, tool correction, contour violation control for tool clearance angle. The cycles for turning operations – Grooving, Undercut, Stock removal, Thread undercut, Thread cutting, Thread chaining	Required
13.43	All other specifications	As per offered controller
13.44	Passwords for operation & maintenance	To be handed over to VSSC
14.00	**DISPLAY FEATURES**	
14.01	Machine position	Required
14.02	Program under execution	Required
14.03	Block number	Required
14.04	Active command block	Required
14.05	Spindle speed (Actual & program value)	Required
14.06	Feed rate (Actual & program value)	Required
14.07	Absolute position	Required
14.08	Distance to go	Required
14.09	Tool number	Required
14.10	offset number	Required
14.11	Error messages if any	Required
14.12	Mode of operation	Required
14.13	Tool under execution	Required
14.14	Relative position	Required
14.15	Part program	Required
14.16	Tool file library	Required
14.17	Tool data	Required
14.18	Work zero	Required
14.19	Drive load meter	Required
15.00	**PORTABLE SERVO HAND WHEEL**	
15.01	Portable servo handwheel with axis selector switch for fine adjustment of axis strokes, selectable ranges (0.1mm, 0.01mm and 0.001mm)	sinumerik HT2
16.00	**COOLANT SYSTEM DETAILS**	
16.01	Recirculating Flood coolant system	Required. Provide details

16.02	Coolant output	Required. Provide details
16.03	Filteration	Paper Band filteration must be provided
16.04	Coolant supply	Programmable via M codes & Manual
16.05	Coolant flush for effective chip evacuation from bed with 20LPM or more	Required
16.06	Coolant tank capacity	1500 litres or more
16.07	Cooling by air blast through spindle centre, selection with M function	Required
16.08	Coolant Spray pistol for chip rinsing	Required
16.09	Coolant temperature control unit with adequate cooling cpacity to maintain coolant temperature 25°C ± 3°C	Required
16.10	Oil and emulsion mist separator, mechanical filter	Required
17.00	**CHIP MANAGEMENT SYSTEM**	
17.01	Chip conveyor for effective chip disposal	Two screw/worm /or equivallent conveyors in the machine bed transport into a cross conveyor (belt-type conveyor) with interval control must suitable for long-chipping material
17.02	Chip Trolly- tilting type	02 Nos
18.00	**LUBRICATION SYSTEM**	
18.01	Lubrication system	Centralised lubrication system. Provide details
18.02	Lubrication mode	Automatic & Manual
19.00	**PNEUMATIC DETAILS**	
19.01	Compressed air requirement	Pl. specify the compressed air requirement viz; pressure, flow rate etc. for various machine operations
19.02	Available air pressure	6 bar
19.03	Air quality	Pl. specify purity level for compressed air mentioning required quality class for particle size, oil ratio & dew point
19.04	Air dryer	Required and to be supplied. Specification of suitable air dryer shall be submitted
20.00	**AUTOMATIC TOOL CHANGER (ATC)**	
20.01	ATC type	Chain or wheel type ATC
20.02	ATC operation	Automatic(via. M-code) & Manual(via push button). Provide detais
20.03	No.of tools	25 (HSK-A63) for milling & 5 (Capto C6) for Turning.
20.04	Tool change system	changer with double gripper
20.05	Tool management	Random bidirectional
20.06	Max. tool diameter (with adjacent tools)	125 mm
20.07	Max. tool diameter (without adjacent tools)	220 mm
20.08	Max. tool length	400 mm
20.09	Max. tool weight	Pl. Specify
20.10	Tool interface	HSK A63
20.11	Chip to Chip time	Pl. Specify
20.12	Pull stud type	Pl. specify

20.13	Control panel for loading station tool magazine with TFT screen 15" Input on touch screen	Preferred
21.00	**ELECTRICAL CONNECTIONS & SUPPLY**	
21.01	Machine should be wired for 3 phase 440V/400V AC, 50Hz supply	Bidder/Tenderer to confirm
21.02	The electrical insulation shall be fully tropicalized and electric system shall be suitable for operation on the specified supply	Bidder/Tenderer to confirm
21.03	Electrical control panels shall conform to CE norms	Bidder/Tenderer to confirm
21.04	Power,control & circuit elements shall be properly labelled as per circuit diagram with proper labeling and color coding	Bidder/Tenderer to confirm
21.05	Electrical cabinet , IP54 protection, including air cooling unit and internal lighting shall be provided	Bidder/Tenderer to confirm
21.06	All sensors, actuators and motor labels are to be printed in metal labels and riveted for more reliability and ease of maintenance	Bidder/Tenderer to confirm
21.07	Power/Electrical load (KVA rating) and Voltage (V) requirement of machine shall be specified	Pl. specify
22.00	**WORKING CONDITION**	
22.01	The machine should work with no complaints in tropicalised condition with temperature of upto 40°C & 95%RH in Trivandrum, India. Supplier should confirm the trouble free operation of machine in that environmental condition.	Bidder/Tenderer to confirm
23.00	**MACHINE GUARDING & SAFETY FEATURES**	
23.01	The machine should be fully enclosed and covered from all sides with suitable guards with observation windows and locking facility. Bed should be accessible from front side via sliding doors, and from the Top through openable Roof Bellow covers. The internal sides of machining area should be protected with fixed panels of Stainless steel, and the moving parts should be protected with bellow covers or telescopic covers so that chips and coolant should not spill out while machining. Top cover should move with front sliding door to facilitate loading of component with overhead crane. It should have suitable opening to facilitate movement of ATC arm.	Bidder/Tenderer to confirm
23.02	Machine guarding and doors for safe working as per international standards shall be provided	Bidder/Tenderer to confirm
23.03	Working area of the machine shall have safety enclosure with transparent windows	Bidder/Tenderer to confirm
	The Top Roof Bellows shall be made of good quality matrial like kevlar, the roof bellows shall be foldable & openable by command from operator panel. There shall be dedicated mechanism comprising of motorized rack & pinion drive to automatically open & close the roof bellows for easy loading & unloading form Top.	Bidder/Tenderer to confirm

23.04	Control system elements shall be enclosed in a dust-proof cabin with air conditioning for protection against dust generated during machining	Bidder/Tenderer to confirm
23.05	Automatic machine shut off with warning in the event of lubrication or coolant failure, spindle off and axis over travel shall be provided	Bidder/Tenderer to confirm
23.06	Emergency stop & retraction function shall be provided for protection against power failure	Bidder/Tenderer to confirm
23.07	Emergency stop should be available on the control panel. Also interlocking provision should be made such that the return line coolant motor is stopped after 2 minutes of emergency stop to avoid spill over of coolant liquid from the return line of coolant tank.	Bidder/Tenderer to confirm
23.08	Machine Protection Control to be provided for Preventive protection by vibration sensor (SDS) at the spindle, Machine protection by quick shutdown & Variable Tool- and Process-specific shut down limit, Process control with bar display in the machine control .	Bidder/Tenderer to confirm
23.09	Software limit switches are to be provided to restrict the total slide travel, maximum feed velocity and maximum spindle speed. Hardware features shall also be available for controlling the above movements.	Bidder/Tenderer to confirm
23.10	Improper tool clamping in the spindle nose shall inhibit spindle rotation and error is to be displayed on the control screen.	Bidder/Tenderer to confirm
23.11	When any of the machine functions like spindle rotation, slide movement, ATC movement etc. come to be a stop without being programmed to stop, the machine shall come to stop, and shall be operated only in the manual mode till the fault is rectified.	Bidder/Tenderer to confirm
23.12	The safety features shall include safety devices against overloading of any drive, over travel of any slide and interlock against conflicting motions	Bidder/Tenderer to confirm
23.13	The tool shall not get unclamped in the event of power failure or an emergency stop	Bidder/Tenderer to confirm
23.14	The machine must be equipped with all safety features necessary to protect the machine, control and the operator while in operation from possible damage/injury	Bidder/Tenderer to confirm
23.15	Ducting areas/cutouts should be properly sealed to avoid entry of rodents into the critical area of the machine	Bidder/Tenderer to confirm
23.16	Entire metal surface should be properly treated to prevent corrosion	Bidder/Tenderer to confirm
23.17	The machine shall be permitted upto 85dBA noise levels as per VSSC standards. Provide details.	Bidder/Tenderer to confirm
23.18	All other safety features are to be complied with CE norms	Bidder/Tenderer to confirm

24.00	**STANDARD ACCESSORIES (To be supplied with the machine)**	
24.01	Chip conveyor with Chip bin	Required
24.02	Cycle for multitool for use of turning tools with more than one blade for turning operations	Required
24.03	Oil skimmer	Required
24.04	Coolant gun for cleaning of chips from the table	Required
24.05	Taper cleaning unit with rotating brushes for spindle taper	Required
24.06	Cabin type splash guard	Required
24.07	Electronic servo hand wheel (Manual Pulse Generator)	Required
24.08	3-tier Process completion lamp	Required
24.09	LED lights for work area illumination	Required
24.10	Sliding door with safety interlock	Required
24.11	Coolant level indicator	Required
24.12	Hydraulic oil level indicator	Required
24.13	First fill of all oils and lubricants	Required
24.14	Machine foundation with levelling plates/pads & screws	Required
24.15	Renishaw High accuracy infrared measuring probe Renishaw Model RMP 600 (or latest available version)with standard measuring cycles	Required
24.16	Measuring cycle package for tilted measuring of components to determine the center of the workpiece and for alignment of the rotation center to the coordinates-origin via a straight line or hole.	Required
24.17	Suitable air dryer of reputed make	Required
24.18	Non-contact type tool length and radius measuring system for Milling tools	Please quote
24.19	Coolant through Centre of Spindle	Stepless pressure programming and flow control by NC program for flow rate of 35 LPM at 10 bar - 23 LPM at 40 bar - Please quote
24.20	Suitable voltage stabiliser with isolation transformer of Indian make: /Servomax/Neel/Consul etc.	Please quote
24.21	CAD model of machine in STEP format for machine simulation in CAM software	Please quote
24.22	Spindle test mandrel length 400mm	Please quote
24.23	5-axis postprocessor for Hypermill (Latest avaialble version)	Please quote
24.24	A 8MP high resolution Camera mounted on Universal head for viewing and monitoring the machine operation with display visible either on CNC system or on a separate monitor mounted on CNC operator pannel	Please quote
24.25	Remote diagonsis feature for the offered CNC control system for online diagonsis and troubleshooting	
25.00	**SPARES** (for two years, pl quote with cost break-up) & **ADDITIONAL ACCESSORIES**	pl quote with cost break-up
25.01	Machine consumables (filters, lubricants, etc). Pl provide detailed list	Please quote

25.02	Hydraulic/Pneumatic spares. Pl provide detailed list	Please quote
25.03	Electrical/Electronic spares. Pl provide detailed list	Please quote
25.04	Any other relevant spares with details.	Please quote
25.05	Contact type tool length and radius measuring system for turning tools	Please quote
25.06	**High End Work Station:** Intel Workstation Series Micro Processors(W series)-Latest generation, 128 Gb RAM, NVIDIA RTX A4000 series or better Graphics Card,1024 Gb Drive Capacity, 27 inch LED IPS Monitor (Non-Touch), Pre-installed Windows 10 Pro/ Windows 11	Please quote
26.00	**MACHINE DIMENSIONS**	
26.01	Total height	Pl.Specify
26.02	Foot Print of Machime	Shall not exceed 10000 mm x 8000 mm. Bidder/Tenderer to confirm
26.03	Total weight of the machine	Pl.Specify
26.04	Machine layout with and without chip conveyor	Pl. provide relevant machine layout drawings
27.00	**PRE QUALIFICATION CRITERIA**	
27.01	The bid shall be prepared, signed and submitted by the manufacturer only. Complete address, contact person, telephone and fax numbers of original manufacturer of the equipment shall be provided.	Required
27.02	Bidder/Tenderer should submit list of users to whom similar or higher capacity machine has been supplied with details of machine size, 5-axis configuration, spindle, speed power and torque etc.	Required
27.03	Reference list of machines of offered model supplied in last five years with postal address, contact person, E-mail ID, contact numbers etc. shall be furnished	Required
27.04	Performance certificates issued by at least THREE reputed users of offered similar configuration of 5-axis machine along with simultaneous interpolated Mill Turn table of diameter 2.5meter or more machine supplied during last 10 years shall be furnished along with the offer	Required
27.05	If the bidder is from a foreign country, bidder must have dedicated service centre in India. The service centre must have been functioning during last 5 years and have proven track record of servicing. They shall have trained and experienced service personnel to provide service support. Please give complete details with documentary evidence.	Required
27.06	The offered machine shall be a standard and proven working model available in the manufacturer’s product range	To be complied

27.07	The propsed machine (including peripharals) is to be installed in a building of size with floor area of 15m(W) x 12m(D). The offered machine shall not have foot print more than 10 m x 8 m. Machine bigger than the available foot print will not be accepted	To be complied
27.08	Bidder may submit the filled compliance statement vis'-a-vis' technical specifications of the tender enquiry along with the technical offer	To be complied
27.09	VSSC reserves right to evaluate the machines listed in the references as a part of technical evaluation and vendor should arrange for the same on our intimation	To be complied
27.10	VSSC reserves right to verify the information provided by the bidder for all clauses mentioned above. In case if there is any suppression of facts or the information provided by the bidder is found to be false/incorrect, the offer shall be summarily rejected.	To be complied
28.00	**PRE-DELIVERY INSPECTION & ACCEPTANCE**	
28.01	The machine shall be inspected as per VDI/DGQ 3441 standard for positional accuracies and ISO standards for geometrical accuracies at manufacturer's premises.	To be complied
28.02	Necessary Laser Calibration and machine tuning with ballbar shall be carried out to prove the positional and interpolation accuracies offered in the bid	To be complied
28.03	Demonstration of all features of the machine, control system & accessories	To be complied
28.04	Presentation of all original certificates, documents, reports, manuals of OEMs of all supplied components connected to the machine	To be complied
28.05	Full power test: Machine maximum power and torque demonstration test (@ 100% Duty cycle) as per international standards for establishing the suitability of spindle with machine and monitoring the levels of vibrations and machine health parameters. The test shall be performed in presence of VSSC engineers and performance report shall be submitted during PDI. Vendor shall have all the required facilities and arrangements for conducting full power test	To be complied
28.06	Endurance test: Supplier shall carry out minimum 24hrs of continuous running at manufacturer's premises and in case of any defect developing during continuous running, the test shall be repeated for another 24hrs till trouble free operation. Endurance test report to be submitted to VSSC during PDI	To be complied

28.07	Machining of test pieces as per NAS979/ISO tests requiring 5-axis simultenous interploation for conforming specificed machine accuracies and performance. All the necessary tools, instruments and materials for above tests are to be arranged by vendor	To be complied
28.08	Dispatch clearance of the machine shall be given by VSSC personnel at vendor's site after satisfactory completion of all the steps mentioned above.	To be complied
29.00	**INSTALLATION AND COMMISSIONING**	
29.01	Vendor shall depute necessary skilled technicians for erection and commissioning at VSSC site	To be complied
29.02	Tests for ensuring positioning accuracies & repeatability, geometrical tests, laser calibration, performance test etc as done in PDI shall be done again at VSSC site to confirm the quality and performance of the machine. Machining one component identified by VSSC requiring 5-axis interpolation to be done. Tool & material for same will be arranged by VSSC	To be complied
29.03	The basic size of the machine (Height x Width x Length) for transferring to installation location should be specified within one month after receipt of the order. This dimension is required to make provision/arrangement for the entry of the machine to the site.	To be complied
29.04	Machine shall be transported in disassembled condition and erected & commissioned at VSSC site	To be complied
29.05	Requirements viz; power, water and compressed air connection etc required for operation of the machine shall be intimated to VSSC by the vendor immediately after receipt of the order.	To be complied
29.06	Detailed foundation design requirements, final foundation drawings, layout drawings etc. if applicable shall be provided by the bidder to VSSC immediately after PO release and its acceptance. The scope of foundation preparation as per bidder's drawing is under VSSC scope.	To be complied
29.07	VSSC shall provide only Fork lifts of maximum capacity 16 Tonnes & EOT Crane of maximum capacity 5 Tonne for erection and commissioning. Any additional material handling equipments/tools/accessories shall be arranged by the bidder at site at their expense	To be complied
29.08	The Bidder or their agent would be required to carry out a joint check at the consignee's end along with VSSC, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages etc. It is necessary that the joint inspection be done immediately on the receipt of the machine.	To be complied
29.09	The Bidder is responsible for any breakage/ damage to the machine or its equipment/ accessories/ tools holders etc. during erection/commissioning of the machine. Bidder shall rectify/replace such damage parts free of cost at site with original parts.	To be complied

29.10	All the lubricating oil, Hydraulic oil, grease etc are to be prefilled by the vendor. Specifications of oil shall be of international standard available in the free market	To be complied
30.00	**TRAINING**	
30.11	The vendor shall provide training to Two VSSC Engineers in Operation, programming and Maintenance (Mechanical, Electrical/ Electronics and CNC system) of the machine at Vendor's works for a period of one week.	To be complied
30.12	The vendor shall impart training to VSSC's Engineers, machine operators and maintenance crew in operation, programming and maintenance after the commissioning of the machine at VSSC works for a period of one week	To be complied
31.00	**DOCUMENTATION**	THREE sets of following documents shall be supplied along with machine
31.01	Operation & Programming instruction manual	Required
31.02	Maintenance manuals for various systems & sub-systems	Required
31.03	Preventive maintenance check list, troubleshooting charts and guidelines	Required
31.04	Transport, Assembly, installation & Commissioning manual	Required
31.05	Foundation drawings/Assembly drawings/foot print and installation instructions (with a check list)	Required
31.06	Catalogues/ OEM Manuals of bought out items	Required
31.07	Complete list of spares & consumables for the machine and its accessories along with spares specification, type, model and name & address of the spare supplier/sub-suppliers	Required
31.08	Detailed specification of all rubber items and hydraulic/lube fittings	Required
31.09	Machine diagram indicating all the service items for easy understanding of location	Required
31.10	Machine test charts	Required
31.11	Calibration certificates with periodicity for all measurable items with calibration procedure/ sources/ periodicity for all the gauges and instruments used in the machine	Required
31.12	Sub-assembly drawings	Required
31.13	Printouts/CD of ladder diagrams(PLC programms) of the machine, machine data, sub routines, circuit diagrams of PCBs etc. for trouble shooting	Required
31.14	Electric & Electronic circuit drawings for control system, DC/SC drives and interface for component level trouble-shooting	Required
31.15	Manufacturing drawings for all supplied tool holders, coolant connections, adapters, sleeves, fixtures etc.	Required
31.16	Backup of all data(NC, CNC, HMI, etc.) to be provided in a working mirror hard disc needed for replacement in the event of failure of original hard disc	Required

32.00	**DELIVERY**	
32.01	Delivery period: Preferably 12 months from the date of confirmed purchase order or after order acceptance in case of foreign supplier	to be quoted
32.02	FOB price, port of shipment,freight and transport charge and insurances shall be clearly indicated and quoted separately in case of imported machine.	Required
33.00	**WARRANTY**	
33.01	Entire machine inclusive of all systems/ accessories, SIEMENS controller & related drives should be warranted for on site replacement for 24 months from the date of installation/ commissioning against all the design, material or manufacturing defects	To be complied
33.02	After completion of warranty and AMC period, as the case may be, the manufacturer or his agent shall agree to provide service supports for trouble-shooting and providing spares. The manufacturer shall be obliged to provide spare parts required by the purchaser for a period of atleast 10 years from the date of commissioning of the machine at the ultimate destination to safeguard against any obsolescence. The bidder shall provide an undertaking for the same.	To be complied
34.00	**ANNUAL MAINTENANCE CONTRACT** (Must be quoted)	
34.01	Supplier should confirm to take up non-comprehensive annual maintenance contract for service and maintenance of the the offered machine with all accessories after the warranty period for THREE years and details has to be provided. Offers without AMC will not be considered. Details of number of visits for preventive maintenance and breakdown maintenance shall be clearly mentioned in the AMC offer. The cost of each visit shall be inclusive of travel and accommodation.	To be complied
35.00	**OTHER POINTS**	
35.01	The bidder shall have requisite facilities for manufacture,testing and inspection as per international standards.	To be complied
35.02	In case there is a mismatch between technical offer and standard catalogue value, VSSC reserve right to take the worst value for the comparison	To be complied
35.03	The bid MUST contain clear, direct, required and actual information with respect to the tender specification/clauses. Descriptive data or words viz "complied", "confirmed", "yes", "no" etc. are not acceptable wherever numerical data or more details are asked. Offers violating these will be treated as rejected.	To be complied

35.04	The tender shall be submitted in TWO parts; in separate sealed covers with clearmarkings as Part-1 and Part-2 respectively. Violation of this will automatically lead to rejection of offer.	To be complied
35.05	The cost of spares and additional accessories (under clause 25) will not considered for cost comparison/commercial evaluation of bids	To be complied
35.06	Part-1: Technical & commercial(excluding price details)	To be complied
35.07	Part-2: Commercial including price details	To be complied
35.08	VSSC reserve right & descrition to place order for additional accessories and spare mentioned in clause 25 based on actual requirement	
35.09	The price bid shall be quoted for basic machine, standard accessories, additional accessories, spares, AMC etc. explicitly. Split-up cost details may be included inside each section of quoted price.	Required
35.10	Total time required in number of working days required for installation & commssioning after the delivery of machine and site readiness shall be mentioned.	Required
35.11	Installation & Commissioning shall be quoted as lumpsum basis including travel, accommodation/lodging and logistics costs.	Required