

**Scope for Retrofitting of Mitsubishi T-Root Machining Center (Model No. K0501521)**  
**Plan No. 2-356, TBM, Bl-3, BHEL Hardwar**

**Brief About Machine:** The machine comprises of six stations. Station no. 1 is Job Loading/ unloading station, Station 2 & 3 are manual machining stations which carry our pre-determined cycles in Auto mode controlled by limit switches. Stations 4, 5 & 6 are CNC controlled machining stations with 2 CNC controlled axes per station. Station no. 4 has two Spindle drives, Station no. 5 has one spindle drive & Station no. 6 has contactor controlled induction motor for spindle. All the stations can run independently in Cycle, Ref and Jog modes in Machine manual mode. In Automatic modes, the machine synchronizes and simultaneously starts the cycle of all the stations; On completion of cycle table indexes after clamping of next Job at station no. 1 and starts cycle once again automatically. Existing CNC System is of Fanuc 7M.

Sl. No	Description	Qty	Accepted (Yes/No)	Deviation	Remarks
<b>1.</b>	<b>MATERIAL SUPPLY</b>				
<b>1.1</b>	<b><u>CNC SYSTEM</u> FANUC latest FS 0i Model D comprising of the following features:</b>	03 Nos.			<u>Bidder to comply</u>
a)	Milling configuration				<u>Bidder to comply</u>
b)	Oriented Spindle stop				<u>Bidder to comply</u>
c)	One RS232, USB & Ethernet port for data transfer				<u>Bidder to comply</u>
d)	Measuring system, lead screw, Backlash & Friction compensation				<u>Bidder to comply</u>
e)	Graphic simulation- Single sided 2D view, dynamic				<u>Bidder to comply</u>
f)	Ladder diagram / STL format should be provided. Ladder program should be editable on the monitor of CNC. Status of various signal should be indicated in ladder diagram				<u>Bidder to comply</u>
g)	CNC user memory for program and data should be 2MB.				<u>Bidder to comply</u>
1.1.1	Machine Operator panel for Mode selection, Feed override, Spindle override, (Auto, Edit, MDI, Remote, Ref return, Jog, Inc Jog, Single Block, Block delete, Program Stop, Optional Stop, Restart, Dry Run, Machine lock. Cycle start, Cycle stop, Spindle Clock wise, SPDL CCW, SPDL Stop & 21 optional programmable key)	03 Nos.			<u>Bidder to comply</u>
1.1.2	Electronic Hand wheel & Handwheel interface (if required) on operator panel-	3 Sets			<u>Bidder to comply</u>

	One no. for each CNC station.				
1.1.3	CF card for data transfer.	6 Nos.			<u>Bidder to provide details and comply</u>
1.1.4	Transcend make CF card reader. Interface cables for connecting CF card with PC and CNC system with PC through Ethernet & RS232 port.	3 Sets			<u>Bidder to provide details and comply</u>
1.1.5	Input/ Output board 96 input & 64 outputs (2 nos. per CNC station)	6 Nos.			<u>Bidder to provide details and comply</u>
1.1.6	12 Nos. X 8 Channel Relay boards per CNC station preferably Phoenix contact make should be provided for driving the PLC outputs to the machine. All PLC outputs to be routed to the machine through these Relay boards.	03 Sets			<u>Bidder to provide details and comply</u>
1.1.7	Existing RELAYS & TIMERS have to be removed but the relay logic has to be retained in new PLC program & electrical scheme.				<u>Bidder to comply</u>
1.1.8	All Software along with communication cables for data back-up & restoration.	01 No.			<u>Bidder to provide details and comply</u>
<b>1.2.</b>	<b><u>AC SERVO MOTORS FOR CNC CONTROLLED AXES &amp; SPINDLE MOTORS FOR 4<sup>TH</sup> (2 Nos.) &amp; 5<sup>TH</sup> STATION (1 No.)</u></b>				
1.2.1.	FANUC $\alpha$ i AC servo motor for Y axis with rated Torque (Mn) of 30 Nm or above and RPM equal to or more than 3000 RPM. (1 no. for each CNC station) <b>Existing motor details are as under:</b> GETTYS Fanuc Permanent Magnet DC Servo Motor Model 20 Type: A06B-0602-B021 Torque (Continuous) :23 Nm Stall Ampere ( Continuous) at Stall : 33 amp	03 Nos.			<u>Bidder to provide details and comply</u>
1.2.2.	FANUC $\alpha$ i AC servo motor <b>with holding brake</b> for Z axis with rated Torque (Mn) of 30 Nm or above and RPM equal to or more than 3000 RPM. ( 1 no. for each CNC station) <b>Pls. note Z axis is fitted with mechanical counterbalance.</b> <b>Existing motor details are as under:</b>  GETTYS Fanuc Permanent Magnet DC Servo Motor Model 20 Type: A06B-0602-B221	03 Nos.			<u>Bidder to provide details and comply</u>

	Torque (Continuous) :23 Nm Stall Ampere ( Continuous) at Stall : 33 amp				
1.2.3	<p>Suitable FANUC αII Spindle Motor (Air cooled) with 7.5 KW or more rated Power &amp; maximum RPM (both Base &amp; Top speed) more than or equal to existing motor. Size constraints for the motor have to be accounted for considering the available space in the machine (For 4<sup>th</sup> station- 2 Nos.). Both motors have to run at same speed and are to be controlled by single Spindle command.</p> <p><b>Existing motor details are as under:</b>  Mitsubishi Electric make DC Motor Super line Type: SF-E, JIS-C_4004 Frame: 132L  Power: 6 KW, 4 Poles 1150/ 3500 RPM with Blower Fan; Field current: 5.1/ 1.3 Amps</p>	02 Nos.			<u>Bidder to provide details and comply</u>
1.2.4	<p>Suitable FANUC αII Spindle Motor (Air cooled) with 15 KW or more rated Power &amp; Maximum RPM 7000 (both Base &amp; Top speed) more than or equal to existing motor. Size constraints for the motor have to be accounted for considering the available space in the machine (For 5<sup>th</sup> station- 1 No.)</p> <p><b>Existing motor details are as under:</b>  Mitsubishi Electric make DC Motor Super line Type: SF-E, JIS-C_4004 Frame: 160L  Power: 12KW, 4 Poles 1150/ 3500 RPM with Blower Fan; Field current: 7.2/ 2.1 Amps</p>	01 No.			<u>Bidder to provide details and comply</u>
1.2.5	Supply of intermediate flanges, couplings and any other parts required for mounting of the Axes AC Servo motors (6 Nos.) and Spindle motors (3 Nos.).	01 Set			<u>Bidder to provide details and comply</u>
<b>1.3.</b>	<b><u>AC SERVO DRIVES &amp; SPINDLE DRIVES</u></b>				
	FANUC make AC Servo drive for Feed motor control with input voltage of 200 VAC (+/- 10%), 3 phase 3 wire system.				<u>Bidder to comply</u>
1.3.1	AC Line Filter with appropriate rating (1 Set for each CNC station). Maximum ratings of motors offered to be taken into account for calculating the ratings of the Module.	03 Sets.			<u>Bidder to provide details and comply</u>
1.3.2	Suitably rated FANUC Double Motor Module (for Y & Z axis motor) -1 Set for each CNC station.	03 Sets.			<u>Bidder to provide details and comply</u>

1.3.3	Suitably rated FANUC Single Line module (For 4 <sup>th</sup> Station spindle motors- 2 Nos.).	02 Nos.			<u>Bidder to provide details and comply</u>
1.3.4	Suitably rated FANUC Single Line module (For 5 <sup>th</sup> station spindle motor- 1 No.)	01 No.			<u>Bidder to provide details and comply</u>
1.3.5	Controller card for Y, Z & Spindle (If required)- 1 Set for each CNC station	03 Sets.			<u>Bidder to provide details and comply</u>
1.3.6	Encoder cables of suitable length for all the six AC Servo motors & three Spindle motors for CNC stations	01 Set			<u>Bidder to provide details and comply</u>
1.3.7	Power cables of suitable length and type for all the six AC Servo motors & three Spindle motors for CNC stations. <b>Please note that Y axis motors are without holding brake &amp; Z axis motors are having holding brake.</b>	01 Set			<u>Bidder to provide details and comply</u>
1.3.8	Shield terminal plates and earthing schematic for all the modules	01 Set			<u>Bidder to provide details and comply</u>
1.3.9	Pre-assembled cables to connect a laptop with the drives for commissioning and diagnosis purposes	01 Set			<u>Bidder to provide details and comply</u>
1.3.10	Servo Tuning card Drives commissioning software on CD (Licensed copy) along with interface cables	01 Set			<u>Bidder to provide details and comply</u>
<b>1.4</b>	<b><u>MEASURING SYSTEM</u></b>				
1.4.1	The existing Y-axis & Z axis motor resolver has to be replaced with in-built motor encoder. The existing resolver is Tamagawa make Type TS530N33E9. The Laser Calibration & setting of pitch error/ backlash compensation of both the axes shall be in the scope of work. (If required)	.			<u>Bidder to provide details and comply</u>
<b>1.5.</b>	<b><u>PLC FEATURES</u></b>				
1.5.1	5 <sup>th</sup> Station CNC system will be Master CNC system to control PLC requirement of Main operator panel and 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> station & Table function.				
1.5.1.1	Indexing table scheme and functioning as per existing relay logic.				<u>Bidder to comply</u>
1.5.1.2	Complete Machine ON functions like Emergency stop of all stations including CNC and non-CNC stations, Ready etc. as per existing logic.				<u>Bidder to comply</u>

1.5.1.3	Control of auxiliary functions and generation of necessary annunciations like Hydraulic, Coolant, Chip conveyor, Slides and Table Lubrication etc. as per existing logic.				<u>Bidder to comply</u>
1.5.1.4	Control of Cycle start of all stations in Auto mode.				<u>Bidder to comply</u>
1.5.1.5	Control of all manual stations i.e. 1 <sup>st</sup> (Loading/ Unloading station), 2 <sup>nd</sup> and 3 <sup>rd</sup> (both are machining stations) stations in their manual and automatic modes as per existing logic.				<u>Bidder to comply</u>
1.5.1.6	Interlocking of all safety features related to all 6 stations (CNC as well as non-CNC)				<u>Bidder to provide details and comply</u>
1.5.1.7	Signal transfer with CNC stations as per existing logic.				<u>Bidder to provide details and comply</u>
1.5.1.8	Incorporation of any other common logic for functioning of the machine as available presently.				<u>Bidder to provide details and comply</u>
1.5.1.9	All existing relays and timers to be removed from the circuit and their logic to be incorporated in the PLC program.				<u>Bidder to comply</u>
1.5.1.10	The logic of the CNC stations (4 <sup>th</sup> , 5 <sup>th</sup> & 6 <sup>th</sup> stations) to be managed in the in-built PLC in their respective CNC systems with interface signals to 5 <sup>th</sup> Station CNC as required by logic of the machine.				<u>Bidder to provide details and comply</u>
1.5.2	PLC has to be provided with 96 Inputs and 64 outputs. In case the vendor perceives that more Inputs/ Outputs are required for completion for the work as per their designed and conceived electrical scheme, the same should be included in the scope of supply. All outputs to be routed through Phoenix contact make relay boards.	02 Set			<u>Bidder to provide details and comply</u>
1.5.3	12 Nos. X 8 Channel Relay boards preferably Phoenix contact make should be provided for driving the PLC outputs to the machine. All PLC outputs to be routed to the machine through these Relay boards.	01 Set			<u>Bidder to provide details and comply</u>
1.5.4	<b>AC INDUCTION MOTORS: All three phase AC induction motors &amp; lubrication pumps are to be replaced with equivalent ones with respect to mounting and ratings of Siemens make. The ratings &amp; details of the motors &amp; lubrication units to be replaced is given below:</b>				<u>Information to the Bidder</u>
1.5.4.1	Hydraulic pump motor to be replaced. Existing Hydraulic pump motor details	01 No.			<u>Bidder to provide</u>

	are as below: 3 phase induction motor, Superline 5.5 KW, Type: ST-F, Rating: Continuous, Frame: 132M, 415 V, 12 A, 950 rpm, 50 Hz				<u>details and comply</u>
1.5.4.2	Oil matic pump motor to be replaced. Existing Oil-matic (cooler for Hydraulic pump) motor details are below: 3 phase induction motor, 4 pole, Nippon Gerotor 0.4 KW, Type: FELQ-8T JISC 4210, Rating: Continuous, Rotor: C, 415 V, 1720 rpm, 50 Hz	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.3	Coolant pump motor to be replaced. Existing Coolant pump motor details are below: 3 phase induction motor, 6 pole, Superline 7.5 KW, Type: SF-F, Rating: Continuous, Frame: 160M, 415 V, 17 A, 900 rpm, Bearing: 6309ZZ and 6308ZZ, Rotor: K2, 50 Hz	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.4	Chip conveyor motor to be replaced. Existing Chip Conveyor motor details are: 3 phase induction motor, 4 pole, Yasakawa 0.4 KW, Type: FELQ-7, Rating: Continuous, 415 V, 0.97 A, 1420 rpm, Rotor: C, Bearing: 4202ZZ, 50 Hz	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.5	Table lubrication motor to be replaced. Existing Table lubrication motor details are: 3 phase induction motor, 4 pole, Superline 0.2 KW, Type: SF-ER, Rating: Continuous, Frame: 132M, 415 V, 0.65 A, 1430 rpm, 50 Hz	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.6	Slide lubrication motor to be replaced. Existing Slide lubrication motor details are: 3 phase induction motor, 2 pole, Willy Vogel, Type: 900178301, Rating: Continuous, 415 V, 0.24 A, 2700 rpm, 50 Hz	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.7	Spindle gear box lubricating pump motor for third station (2 nos.) and sixth station (1 nos.) to be replaced. Existing Spindle gear box lubricating pump motor for third station (2 nos.) and sixth station (1 nos.) details are: 3 phase induction motor, 4 poles, Trochoid Pumps 75 W, Type: HT-NR, Rating: Continuous, 415 V, 0.32 A, 1400 rpm, 50 Hz, Rotor: C, Bearing: 6202 and 6200	03 No.			<u>Bidder to provide details and comply</u>
1.5.4.8	Table motor to be replaced. Existing Table motor details are: 3 phase induction motor, 6 poles, Superline 3.7 KW, Type: SF-E Rating: Continuous, Frame: 132S, 415 V, 8.5 A, 950 rpm, 50 Hz, with inbuilt brakes, motor JP44 brake JP20, Bearing: 6210ZZ & 6307ZZ, Braking torque above	01 No.			<u>Bidder to provide details and comply</u>

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1.5.4.9	Second station Spindle motor to be replaced. Existing Second station Spindle motor details are: 3 phase induction motor, 4 poles, Superline 11KW, Type: SF-E, Rating: Continuous, Frame: 160M , 415 V, 21 A, 1430 rpm, 50 Hz, Rotor: K2, Bearing: 6309ZZ and 6308ZZ	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.10	Second station Column tilting motor to be replaced. Existing Second station Column tilting motor details are: 3 phase induction motor, 4 poles, Superline 0.75 KW, Type: SF-E, Rating: Continuous, Frame: 90L , 415 V, 2.4 A, 950 rpm, 50 Hz, Bearing: 6205ZZ and 6204ZZ	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.11	Second station Column feed motor to be replaced. Existing Second station Column feed motor details are: 3 phase induction motor, 4 poles, Superline 4 KW, Type: SF-EF, Rating: Continuous, Frame: L5-100L , 415 V, 4.7 A, 950 rpm, 50 Hz, Bearing: 6206ZZ and 6205ZZ	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.12	Third station Spindle motor (Left & Right) to be replaced. Existing Third station Spindle motor (Left & Right) details are: 3 phase induction motor, 6 poles, Superline 7.5KW, Type: SF-E, Rating: Continuous, Frame: 160M , 415 V, 17 A, 960 rpm, 50 Hz, Rotor: K2, Bearing: 6309ZZ and 6308ZZ	02 No.			<u>Bidder to provide details and comply</u>
1.5.4.13	Third station Head Feed motor (Rapid) to be replaced. Existing Third station Head Feed motor (Rapid) details are: 3 phase induction motor, 6 poles, Superline 3.7KW, Type: SF-E, Rating: Continuous, Frame: 132S , 415 V, 8.5 A, 1430 rpm, 50 Hz, Rotor: C, Bearing: 6208ZZ and 6307ZZ	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.14	Third station Head Feed motor (Cutting Feed) to be replaced. Existing Third station Head Feed motor (Cutting Feed) details are: 3 phase induction motor, 4/8 poles, Superline 2.2KW, Type: SF-E, Rating: Continuous, Frame: 112M , 415 V, 4.3 A, 1440 rpm, 50 Hz, Bearing: 6207ZZ and 6206ZZ	01 No.			<u>Bidder to provide details and comply</u>
1.5.4.15	Sixth station Spindle motor to be replaced. Existing Sixth station Spindle motor	01 No.			<u>Bidder to provide</u>

	details are: 3 phase induction motor, 4 poles, Superline 5.5 KW, Type: SF-E, Rating: Continuous, Frame: 132S , 415 V, 11.54 A, 1440 rpm, 50 Hz, Rotor: K2, Bearing: 6208ZZ and 6209ZZ				<u>details and comply</u>
<b>1.6</b>	<b><u>ELECTRICAL FEATURES</u></b>				
1.6.1	Operator Panels for all CNC stations should be aesthetic & with the following features: a) Floor mounted of suitable height b) Height of the operator panel & display to be suitable for person of average height (5'5") c) Fitted with suitable air conditioner d) Swivel of minimum 180 degrees e) Front side should have two side handles for rotating by hand f) The rear door should be on hinges and not screw mounted g) Illumination light with switch for working in the operator panel h) 220 VAC/ 5 Amp 3-pin service socket and switch	03 Nos.			<u>Bidder to provide details and comply</u>
1.6.2	New electrical cabinet with suitable air-conditioner to be supplied for the electrical items including Drives, LV switchgear etc. The maximum panel height should be 2 meters. Therefore the Electrical cabinet should be dust & vermin proof. No elements should be mounted on the back-side of the panel.	01 Set			<u>Bidder to provide details and comply</u>
1.6.3	The operator panels of CNC stations, CNC cabinets & Electrical cabinets are to be removed. The main common operator panel, 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> station operator panels are to be retained. Vendor to provide 100 nos. indicating lamp 24V/ 2W of the type used on the machine (Existing lamps are wired to 16 V supply and are 2W) and rewire the above with new lugs, ferrules and conduits as required.	01 Set			<u>Bidder to provide details and comply</u>
1.6.4	L&T/Siemens/ABB/ Schneider Electric make MCCB with rotary handle kit of appropriate rating as per the new scheme (25% over-rated to maximum load) for switching on the power supply of panel & machine to be mounted at operator height on the right side of panel.	01 No.			<u>Bidder to provide details and comply</u>
1.6.5	Suitable Semiconductor, HRC fuses, fuse bases of GE/ SIEMENS/ BUSSMAN make for overload protection.	02 Sets			<u>Bidder to provide details and comply</u>

1.6.6	The complete LV switchgear of the machine including overloads, relays, contactors, MCBs, MPCBs etc. is to be supplied & interfaced by the vendor as per existing scheme. Vendor must interface each induction motor with MPCB for single phase and overload protection.	01 Set			<u>Bidder to provide details and comply</u>
1.6.7	Electrical Cabinet to be equipped with a) Door limit switch operated panel tube lights with by-pass switch b) 15 Amp 3-pin service socket and switch	02 Nos.			<u>Bidder to provide details and comply</u>
1.6.8	Additional Keys, Push-buttons, Indicator lamps/ lamp holders& Selector switches required on the operator panel for operation of the machine to be provided by the vendor	01 Set			<u>Bidder to provide details and comply</u>
1.6.9	DC Regulated Power Supply 24V DC, 40 Amps of Siemens/Phoenix/M-System	02 Nos.			<u>Bidder to provide details and comply</u>
1.6.10	DC Regulated Power Supply 24V DC, 10 Amps of Siemens/Phoenix/M-System	04 Nos.			<u>Bidder to provide details and comply</u>
1.6.11	Sealed machine light of reputed make having halogen lamp (Minimum 70 W)/ Sealed tube-light (220 V AC/24VDC) to be installed.	06 Nos.			<u>Bidder to provide details and comply</u>
1.6.12	Wires for rewiring of the entire machine including Control, signal & Power cabling (including Cabling to Spindle & feed motors). Supply to the machine will be provided by BHEL. The vendor to note that the entire machine has to be rewired.	01 Set			<u>Bidder to provide details and comply</u>
1.6.13	Vendor should provide the proposed electrical schematic along with bill of material to BHEL for approval prior to dispatch.				<u>Bidder to provide details and comply</u>
1.6.14	Terminal boxes, screwed terminal blocks, bus bars, transformers etc. as required per the new electrical scheme should be provided of reputed makes viz. Wago, Phoenix contact etc.	01 Set			<u>Bidder to provide details and comply</u>
1.6.15	Vendor must supply 415V/100V transformer of 2KVA rating of reputed make. The solenoid valves used on the machine are with 100V AC coil voltage and the same are to be retained.	02 Nos.			<u>Bidder to provide details and comply</u>
1.6.16	4 colored signal light display (LED type) should be interfaced with PLC to show the operational status of the machine and visible from a distance.	06 Nos.			<u>Bidder to provide details and comply</u>
1.6.17	Terminal boxes, screwed terminal blocks, bus bars, transformers etc. as required				<u>Bidder to provide</u>

	per the new electrical scheme should be provided of reputed makes viz. Wago, Phoenix contact etc.				<u>details and comply</u>
1.6.18	All existing Limit switches, pressure switches, flow switches are to be replaced with digital variants for pressure/ flow switches & Limit switches of reputed make. All the above shall be replaced with 24 VDC based elements from reputed make manufacturers.				<u>Bidder to comply</u>
1.6.19	415V/ 200V transformer (64 KW) is available; Additional transformer for all Feed & Spindle drives, CNCs etc. to be included in the Scope of supply.	01 Set			<u>Bidder to provide details and comply</u>
<b>1.7</b>	<b><u>OTHER FEATURES</u></b>				
1.7.1	Design and supply of intermediate flanges, couplings and any other parts required for mounting of AC Servo motors (6 Nos.) & Spindle motors (3 Nos.).	01 Set			<u>Bidder to provide details and comply</u>
1.7.2	Set of keys for Electrical cabinet & Operator Panel locks	03 Sets			<u>Bidder to comply</u>
1.7.3	Lapp make hose pipes, DIN rails (5 meters), cable ducts (5 meters), insulated lugs(0.5, 1.0, 1.5 sq. mm 200 nos. each & 2.5, 4.0 sq. mm 100 nos. each), printed ferrules (0-9 of 1.0 & 1.5 sq. mm 200 each and A-Z of 1.0 & 1.5 sq. mm 100 each) and other material required for the wiring of Machine, Electrical & Operator panels.	01 Set			<u>Bidder to provide details and comply</u>
1.7.4	Party shall supply all clamps, fixtures and fasteners required to complete the job.	01 Set			<u>Bidder to comply</u>
1.7.5	Any other material not mentioned above but found necessary to complete the job, shall be in party's scope of supply	01 Set			<u>Bidder to comply</u>
<b>2.</b>	<b><u>COMMISSIONING:</u></b>				
2.1	Party shall undertake commissioning of the supplied components at HEEP, BHEL, Haridwar. All material required for commissioning of the system with the machine shall be supplied by the party free of cost and obligation. All commissioning materials shall be supplied by party.				<u>Bidder to comply</u>
2.2	Existing machine logic and technological processes have to be retained.				<u>Bidder to comply</u>
<b>3.</b>	<b><u>FINAL ACCEPTANCE:</u></b>				
3.1	Party shall demonstrate operation of all parts of the system supplied along with				<u>Bidder to comply</u>

	all the features as specified above.				
3.2	Demonstration of seamless running of already existing programs (compatible with earlier Fanuc 7M CNC system) without any modification through machining of two types of blades (5 nos. each for Guide & Moving blades). The blank raw material, tooling, fixture & existing programs for machining of the blades will be provided by BHEL.				<u>Bidder to comply</u>
3.3.	Final Acceptance shall be at BHEL, Hardwar after successful commissioning, testing of the supplied system for all operations and successful machining of two types of blades (5 nos. each for Guide & Moving blades) with earlier existing programs as per para no. 3.2.				<u>Bidder to comply</u>
3.4	After settlement of all pending issues related to work and supply, a certificate for Completion of works in all respect shall be released within 15 days by Production and Maintenance personnel of BHEL which will be the referred document for Final Acceptance and final payment to the vendor.				<u>Bidder to comply</u>
<b>4.</b>	<b><u>DELIVERY:( IF DELIVERY PERIOD IS NOT OFFERED/ ACCEPTABLE, OFFER WILL BE REJECTED)</u></b>				
	<ul style="list-style-type: none"> <li>i. Material: 6 months from the date of release of the Work order.</li> <li>ii. Work : 10 weeks from date of release of machine for work. The delivery period of work for the purpose of LD as per Clause 11 shall be considered from the date of start of work to the date of start of the machine after carrying out the work and start of the work on the first prove-out component.</li> <li>iii. <b>Vendor to note that early delivery shall be acceptable. Vendor should take BHEL approval before invoking this clause.</b></li> </ul>				<u>Bidder to comply</u>
<b>5.</b>	<b><u>DOCUMENTATION</u></b>				
	Following documents shall be supplied by the Party:				
5.1	CNC system manuals in hard copy comprising of Installation & Start-up guide, Connecting conditions, Configuration guide, Diagnostics guide, Commissioning guide	03 Sets			<u>Bidder to provide details and comply</u>

5.2	Programming Manuals	02 Sets			<u>Bidder to provide details and comply</u>
5.3	Technical and Service manuals of the AC servomotors & Spindle motors in hard copy.	03 Sets			<u>Bidder to provide details and comply</u>
5.4	Commissioning and service manuals of the AC servo drive & Spindle drives	03 Sets			<u>Bidder to provide details and comply</u>
5.5	Commissioning and service manuals of the PLC	02 Sets			<u>Bidder to provide details and comply</u>
5.6	PLC program hard copy with comments & cross-reference list	03 Sets			<u>Bidder to provide details and comply</u>
5.7	PLC program on CD in installable & printable formats	01 Set			<u>Bidder to provide details and comply</u>
5.8	New electrical schematic of the machine	03 Sets			<u>Bidder to provide details and comply</u>
5.9	Instructions for data back-up & restoration for CNC & PLC	03 Sets			<u>Bidder to provide details and comply</u>
5.10	All documentation, CNC, Spindle & Feed Drive parameters & back-up on CD	01 Set			<u>Bidder to provide details and comply</u>
5.11	Documentation of all bought-out items	03 Sets			<u>Bidder to provide details and comply</u>
<b>6.</b>	<b><u>SPARE PARTS (TO BE COMPULSORILY QUOTED OTHERWISE OFFER WILL BE REJECTED) :</u></b>				
6.1	Active Line Module with Line filter and HF commutating choke of appropriate rating of the highest rating used on the machine.	01 Set			<u>Bidder to provide details and comply</u>
6.2	Double Motor Module (for Y & Z axis motor).	01 No.			<u>Bidder to provide details and comply</u>
6.3	Single Line module (For 4 <sup>th</sup> Station spindle motors).	01 No.			<u>Bidder to provide details and comply</u>
6.4	Single Line module (For 5 <sup>th</sup> station spindle motor)	01 No.			<u>Bidder to provide details and comply</u>

6.5	Y-axis motor	01 No.			<u>Bidder to provide details and comply</u>
6.6	Z axis motor	01 No.			<u>Bidder to provide details and comply</u>
6.7	Complete CNC control	01 No.			<u>Bidder to provide details and comply</u>
<b>7.</b>	<b><u>WARRANTY:</u></b>				
	Party shall stand warranty for all the supplied material and work executed for a period of one year from the date of successful commissioning of the machine at BHEL, Haridwar.				<u>Bidder to comply</u>
<b>8.</b>	<b><u>TRAINING:</u></b>				
8.1	Party shall impart training to BHEL staff, for operation, programming & maintenance of the system supplied by them during installation & commissioning.				<u>Bidder to provide details and comply</u>
8.2	Vendor to arrange one week's training each for Maintenance & commissioning, Programming & Operating of CNC system at CNC System manufacturer's works. Expenses for Boarding & Lodging of BHEL personnel during training shall be borne by BHEL.				<u>Bidder to provide details and comply</u>
<b>9.</b>	<b><u>VENDOR'S OBLIGATION:</u></b>				
	The vendor shall bring all tools, tackles and testing equipment with them for successful commissioning of supplied system.				<u>Bidder to comply</u>
<b>10.</b>	<b><u>QUALIFYING CONDITIONS</u></b>				
10.1	The average annual turnover during the last three years ending March 31 <sup>st</sup> 2013 should be at least ₹ <b>28.09 Lacs</b> . Audited balance sheets for the last three years should be submitted.				<u>Bidder to provide details &amp; comply</u>
10.2	The Vendor must have successfully retrofitted CNC machines with Fanuc CNC				<u>Bidder to provide</u>

	<p>system during last seven years ending 30<sup>th</sup> March'2014 and should be either of the following:</p> <p><b>a). Three no.</b> of CNC machines retrofitted with Fanuc CNC system with project costing not less than ₹ <b>37.46 Lacs.</b></p> <p style="text-align: center;">OR</p> <p><b>b). Two no.</b> of CNC machines retrofitted with Fanuc CNC system with project costing not less than ₹ <b>46.82 Lacs.</b></p> <p style="text-align: center;">OR</p> <p><b>c). One no.</b> of CNC machines retrofitted with Fanuc CNC system with project costing not less than ₹ <b>74.91 Lacs.</b></p> <p>The above retrofitted machines should be running satisfactorily for at least 6 months prior to 30<sup>th</sup> March'2014. 6 months period will be calculated on the basis of commissioning certificates provided.</p> <p>Vendor to provide P.O. / W.O copies and commissioning/ performance certificates for satisfactory operation of the above retrofitted systems along with name, address &amp; contact details of their customer. BHEL reserves the right to verify the information provided. Vendor is advised to attach only the relevant certificates and not attach papers irrelevant against this clause.</p>				<u>details &amp; comply</u>
<b>11.</b>	<b><u>LATE DELIVERY PENALTY (LD) CLAUSE:-</u></b>				<u>Bidder to comply</u>
11.1.	<p>LD @ ½% per week subject to a maximum of 10% of the Material cost including spare parts shall be applicable for delay in deliveries.</p> <p>The time period from invitation date for Pre dispatch inspection from vendor to the date of arrival of Pre Dispatch Team to vendor's works and any other reasons attributed to BHEL will not be accounted for in delivery period. This period will be excluded for the purpose of calculating LD. Vendor should intimate regarding PDI 7 days in advance only.</p>				<u>Bidder to comply</u>
11.2.	<p>LD @ 2% per week subject to a maximum of 10% of the Commissioning Charges shall be applicable for delay beyond scheduled commissioning date as per Clause 4 ii) for reasons attributed to the party.</p>				<u>Bidder to comply</u>

<b>12.</b>	<b><u>PRE-DISPATCH INSPECTION</u></b>				<u>Bidder to comply</u>
12.1	Pre-dispatch inspection of all the items covered under Scope of Supply at Para (1) & spares at Para (6) shall be carried out by BHEL personnel at party's works.				<u>Bidder to comply</u>
12.2	Supplier shall invite BHEL for carrying out pre- inspection.				<u>Bidder to comply</u>
12.3	Deputed BHEL persons shall do pre acceptance of material under scope of supply at vendor works and give despatch clearance.				<u>Bidder to comply</u>
12.4	Expenses of Boarding and lodging of BHEL personnel during PDI shall be borne by BHEL.				<u>Bidder to comply</u>
<b>13.</b>	<b><u>SUBMISSION OF BILL OF MATERIAL (BOM)</u></b>				<u>Bidder to comply</u>
	Before inviting BHEL for Pre-dispatch inspection, vendor shall submit to BHEL the Bill of Material (BOM) and proposed electrical drawing/ schematic for scrutiny.				<u>Bidder to comply</u>
<b>14.</b>	<b><u>EARNEST MONEY DEPOSIT ( EMD):</u></b>				<u>Bidder to comply</u>
14.1	Vendors have to deposit the ₹ 1,50,000/- as EMD. EMD may be deposited in cash, through pay order or through demand draft in favor of HEEP, BHEL, Haridwar only.				<u>Bidder to comply</u>
14.2	EMD shall be converted to security deposit if the work is awarded.				<u>Bidder to comply</u>
14.3	EMD of unsuccessful bidders shall be refunded back normally within fifteen days of acceptance of award of work by the successful bidder.				<u>Bidder to comply</u>
14.4	EMD shall not carry any interest.				<u>Bidder to comply</u>
14.5	EMD by bidder will be forfeited as per tender document, if:				<u>Bidder to comply</u>
14.5.1	After opening the tender, the tenderer revokes his tender within the validity period or increases his earlier quoted rates.				<u>Bidder to comply</u>
14.5.2	The tenderer does not commence the work within the period as per LOI/contract.				<u>Bidder to comply</u>
14.6	<b>Offers without EMD will be rejected and will not be considered for evaluation. However in special cases, valid NSIC certificate may be considered at the discretion of BHEL management.</b>				<u>Bidder to comply</u>

<b>15.</b>	<b><u>SECURITY DEPOSIT (SD):-</u></b>				<u>Bidder to comply</u>
15.1	Successful vendor shall deposit security. The rate of security deposit will be as below:				<u>Bidder to comply</u>
	• For work Up to ₹ 10 Lakhs : <u>10% of work order value</u>				<u>Bidder to comply</u>
	• Above ₹ 10 Lakhs upto ₹ 50 Lakhs : ₹ <u>1 Lakh + 7.5% amount exceeding ₹10 Lakhs</u>				<u>Bidder to comply</u>
	• Above ₹ 50 Lakhs: ₹ <u>4 Lakhs + 5% amount exceeding ₹ 50 Lakhs</u>				<u>Bidder to comply</u>
15.2	The security deposit should be submitted before the start of work in the following forms:				<u>Bidder to comply</u>
	i) Cash (As permissible under the Income Tax Act)				<u>Bidder to comply</u>
	ii) Pay Order, Demand Draft in favour of HEEP, BHEL, Haridwar				<u>Bidder to comply</u>
	iii) Local cheques of Scheduled Banks, subject to realization.				<u>Bidder to comply</u>
	iv) Bank Guarantee from Scheduled Banks/Public Financial Institution as defined in the companies Act. The Bank guarantee format should have the approval of BHEL.				<u>Bidder to comply</u>
15.3	Security Deposit shall not carry any interest.				<u>Bidder to comply</u>
15.4	EMD of successful tenderer can be converted and adjusted against the Security Deposit.				<u>Bidder to comply</u>
15.5	<b>100% of the Security Deposit</b> amount shall be refunded to the vendor after final acceptance of work. <b>SD shall be released after the submission of Performance Bank Guarantee (PBG) by the vendor.</b>				<u>Bidder to comply</u>
<b>16.</b>	<b><u>PERFORMANCE BANK GUARANTEE (PBG):-</u></b>				<u>Bidder to comply</u>
16.1	Vendor shall be required to submit a Performance Bank Guarantee (PBG) for 10% of the total work order/ contract value which shall be valid for a period of 12 months from the date of final acceptance of the machine.				<u>Bidder to comply</u>
16.2	The PBG shall be submitted on a non-judicial stamp paper of value not less than ₹100/- issued by any one of the nationalised banks.				<u>Bidder to comply</u>
<b>17.</b>	<b><u>PAYMENT TERMS:</u></b> <b>(Note : No advance payment shall be made to the vendor.)</b>				<u>Bidder to comply</u>

17.1	Part payment will be made after completion of following milestones				<u>Bidder to comply</u>
17.1.1	Payment of 80% of material cost along with 100% of all taxes & duties (Excise duty, CST/VAT as applicable) shall be payable after inspection & acceptance of material at HEEP, BHEL, Haridwar. Vendor to ensure that all relevant documents are submitted.				<u>Bidder to comply</u>
17.1.2	Final payment of balance 20% of material cost, 100% of commissioning charges including service taxes as applicable amount will be made after Final acceptance of the machine (As per Clause 3). The payment shall be made subject to submission of PBG as per "Para 16".				<u>Bidder to comply</u>
17.2	All the payments shall be made through e-payment after submission of following documents along with first bill.				<u>Bidder to comply</u>
17.2.1	E-payment form duly filled (Form will be provided by BHEL)				<u>Bidder to comply</u>
17.2.2	Income tax exemption letter( if applicable)				<u>Bidder to comply</u>
17.3	Excise duty & CST/VAT will be paid on material cost and service tax will be paid on commissioning charges at actual. Related original documents to be submitted for availing MODVAT credit by BHEL.				<u>Bidder to comply</u>
<b>18.</b>	<b><u>Risk Purchase Clause</u></b> : In case of delays in supplies / defective supplies or non-fulfilment of any other terms & conditions given in the work order the purchaser may cancel the work order in full or part thereof and may also make the purchase of the material / service from elsewhere / alternative source at the risk and cost of supplier. Vendor does not agree to above clause, their offer is liable to be rejected. In case any vendor accepts risk purchase clause initially and subsequently declines to honour the term in the eventuality of RISK PURCHASE, they may be banned for business with BHEL.				<u>Bidder to comply</u>
<b>19.</b>	<b><u>GENERAL CONDITIONS:</u></b>				
19.1	A point wise compliance statement shall be submitted by the party with reference to the above scope of supply against each clause/ sub-clause with relevant details & comments. Non-compliance to any of the clauses & quoting				<u>Bidder to comply</u>

	inadequate quantity can lead to dis-qualification of the offer.				
19.2	The Vendor is advised to inspect the machine & collect sample existing machining programs (compatible with existing Fanuc 7M system) to ascertain all the relevant details required for successful completion of the work.				<u>Bidder to comply</u>
19.3	The proposed electrical schematic & Bill of Material for the machine shall be provided by the vendor prior to pre dispatch inspection.				<u>Bidder to comply</u>
19.4	Complete specifications such as part no./Model/Type, power, torque, Rated and maximum RPMs, Rated and maximum currents of the motor and drive controllers shall be stated in the offer by the party. Ordering brochure/catalogue should be attached.				<u>Bidder to comply</u>
19.5	Vendor must compulsorily quote the quantity exactly as per the Scope of supply. No reduction in quantity as per the above Scope of supply is permissible.				<u>Bidder to comply</u>
19.6	Vendor must quote the Spare parts separately in the offer otherwise the offer will be rejected.				<u>Bidder to comply</u>
19.7	The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site <a href="http://www.bhel.com">www.bhel.com</a>				<u>Bidder to comply</u>
19.8	<b>The award of works will be made on basis of the total of Material cost , Spare Parts cost, Commissioning charges and all taxes, duties as applicable ( Cost to BHEL).</b>				<u>Information to Bidder</u>
19.9	The Vendor should submit their best price at this stage itself and they will not be allowed to revise the price. Any revision / discount given by the vendor subsequently will be ignored.				<u>Information to Bidder</u>
19.10	Check List as per Annexure 'C' must be enclosed with techno-commercial bid.				<u>Bidder to comply</u>
19.11	The risk of delay/loss in transmission by post/courier rest with the bidder.				<u>Bidder to comply</u>
19.12	Conditional tender is likely to be rejected.				<u>Bidder to comply</u>
19.13	BHEL reserves the right to reject the lowest or any tender or accept any tender in full or in part without assigning any reasons whatsoever.				<u>Bidder to comply</u>
19.14	If any information/documents submitted by the contractor are found false/fake at any stage, the tender will be cancelled and earnest money deposited shall be				<u>Bidder to comply</u>

	forfeited debarring from the future participation in tenders.				
19.15	In case more than one contractor quotes equal L-1 rates, lottery shall be drawn among L-1 parties to decide one L-1 party.				<u>Bidder to comply</u>
<b>20.</b>	<b><u>BHEL'S OBLIGATION:</u></b>				
20.1	Existing electrical schematic of the machine shall be provided by BHEL to the vendor.				<u>Bidder to comply</u>
20.2	Crane facility along with lifting tackles, trolleys etc. will be made available free of charge while working in BHEL premises only.				<u>Bidder to comply</u>
20.3	Facilities of minor welding, brazing, minor machining limited to fitting work /rework etc. will be made available free of cost inside BHEL premises subject to availability.				<u>Bidder to comply</u>
20.4	Any civil work required for the erection of panel shall be done by BHEL.				<u>Bidder to comply</u>
20.5	Consumables like lubricants, kerosene oil, cotton waste etc. will be supplied free of cost by BHEL during execution of works inside BHEL premises. Contractor should make his own arrangements for all types of hand tools including pneumatic/electrical drill machines, grinders, scraping tools along with the general purpose measuring instruments, straight edges etc.				<u>Bidder to comply</u>
<b>21.</b>	<b><u>OFFER :-</u></b> The offer should be submitted in two parts and in following manner.				
21.1	<b><u>Techno-commercial Bid :</u></b>				
21.1.1	The envelop shall contain the Techno-commercial Bid ( <b>ANNEXURE 'A'</b> ) with technical details and commercial terms & conditions along with relevant documents like copies of ESI, PF code, PAN No., Service Tax Regn. No., TIN No., CST No., Experience Certificates, Audited Balance Sheet of last 3 years, P.O copies & Commissioning/ Performance certificates (against Pre-qualifying conditions), <b>Tender fees, EMD</b> and Check List as per <b>ANNEXURE 'C'</b> .				<u>Bidder to comply</u>
21.1.2	The envelop shall be super scribed with "Techno-Commercial Bid", Name of work & NIT No.				<u>Bidder to comply</u>

21.1.3	Point-wise compliance of this scope of supply and work is to be given by vendors while submitting their techno-commercial offer in the format provided by BHEL. Each page of the compliance list has to be signed by the vendor.				<u>Bidder to comply</u>
21.1.4	The vendor must note that no prices are to be quoted/ mentioned in the techno-commercial offer. Vendor must include un-priced Price bid.				<u>Bidder to comply</u>
21.2	<b>Price Bid :</b>				
21.2.1	The second envelope shall contain only the price bid with separate price for material, spares, work & applicable taxes & duties on Price Bid Format only as per <b>ANNEXURE 'B'</b> .				<u>Bidder to comply</u>
21.2.2	Any other information in the price bid shall not be considered and the quotation is likely to be rejected. Price bid document shall be signed by the bidder at the bottom of the page.				<u>Bidder to comply</u>
21.2.3	The envelope shall be sealed and super scribed with "Price Bid", Name of work & NIT No.				<u>Bidder to comply</u>
21.2.4	Price bids of techno commercially accepted vendors shall be opened.				<u>Bidder to comply</u>
21.3	Vendor should submit their best price at this stage itself and they will not be allowed to revise the price. Any revision/ discount given by the vendor subsequently will be ignored.				<u>Information to Bidder</u>
21.4	Both the above two envelopes shall be kept in another sealed cover. The cover shall be super-scribed with "Quotation for (name of work), NIT No. & due date and shall be submitted in the <b>Tender Box kept in the Tender room of Purchase department at the 4th floor of the Main Administrative Building of BHEL,HEEP,HARIDWAR</b> and it should also contain the Bidder's address.				<u>Bidder to comply</u>
21.5	In case the date of tender opening happens to be a BHEL declared holiday, tenders shall be opened on the next working day.				<u>Information to Bidder</u>
<b>22.</b>	<b>COMMERCIAL TERMS:</b>				
22.1	Prices shall be quoted on "Firm Price" basis only. <b>The prices should be on F.O.R BHEL, Haridwar basis inclusive of Packing &amp; Forwarding, transit insurance &amp; Transportation charges.</b> Applicable % of ED & Sales Tax,				<u>Bidder to comply</u>

	Installation/ Commissioning Charges & Service Tax should be clearly indicated in attached Price bid format as per “ <b>Annexure B</b> ”				
22.2	Validity of offer shall be for a minimum period of 120 days from the date of Tender Opening.				<u>Bidder to comply</u>
22.3	Freight & transit insurance charges from Dispatching station to BHEL, Haridwar shall be borne by the party.				<u>Bidder to comply</u>
22.4	The material will be dispatched to <b>Central Plant Stores, HEEP, BHEL, Haridwar</b> with instructions to forward the same to <b>Sr. Engineer (WEX/CNC-BLADES), HEEP, BHEL, Haridwar-249403</b>				<u>Bidder to comply</u>
<b>23.</b>	<b>PACKING:</b>				
	Supplier shall arrange for adequate protection and packing of the consignment so as to avoid loss and damage during transit and also take appropriate measures to prevent metal parts from rusting and corrosion during transit. Handling instructions shall be clearly printed /painted on the packages. Each package should carry a detailed packing slip. Supplier shall be responsible for any loss/damage during transit due to defective/inadequate packing.				<u>Bidder to comply</u>

**ANNEXURE 'B' (PRICE BID FORMAT)**

Name of Work :

NIT No. & Date :

Bidder's Offer No. & Date :

Sl. No.	Description of item	Unit	Qty	Basic Rate (in ₹)	Excise Duty (in %)	VAT/CST (in%) (VAT with FORM-17 or CST with C-FORM)	Service Tax (in %)	Total Value (in ₹)
1	Material	Set	01	₹	%	%		₹
2	Spares	Set	01	₹	%	%		₹
3	Installation & Commissioning	Set	01	₹			%	₹
	<b>TOTAL COST (in Figures)</b>							₹
	<b>TOTAL COST (in Words) :</b>							

**Note: Bidder may please note that all relevant columns should be duly filled up and in case any column is left blank it will be considered as inclusive in the prices quoted. All pages to be duly signed and stamped by authorised signatory.**

**Annexure 'C'**  
**CHECK LIST FOR TENDER**

**NIT No. :** \_\_\_\_\_

Bidder shall ensure that following documents / particulars have been enclosed with tender. This check list shall be enclosed with Techno-commercial Bid.

<b>S. No.</b>	<b>Particulars</b>	<b>YES/NO</b>	<b>REMARKS</b>
1.	<b>Sealed Techno-commercial Bid with Un-priced price bid</b> as per Annexure 'A' of NIT		
2.	<b>Sealed Price Bid</b> as per Annexure 'B' of NIT		
3.	<b>Compliance</b> to all the points of the Annexure 'A' of NIT		
4.	<b>Audited balance sheets</b> for the last three years should be submitted i.e, 2012-13, 2011-12, 2010-11 required as per Clause 10.1 of Annexure 'A' of NIT		
5.	<b>P.O. copies and Commissioning/ Performance certificates</b> required as per Clause 10.2 of Annexure 'A' of NIT		
6.	<b>Name, address &amp; contact details of their customer</b> required as per Clause 10.2 of Annexure 'A' of NIT		
7.	<b>Tender Fee</b> enclosed		
8.	<b>Earnest Money Deposit (EMD)</b> required as per Clause 14 of Annexure 'A' of NIT		
9.	<b>Complete specifications</b> such as Part no. / Model / Type of Drive and Servo motors, power, torque, Rated and max. RPMs, Rated and max. currents of servo motors. Ordering brochure/catalogue should be attached required as per Clause 19.4 of Annexure 'A' of NIT		

Sign & Seal