

**Annexure-A**

**Scope for Re-conditioning and Retrofitting of Droop & Rein Copy-milling NC Machining Center (Model No. FS 130gke, Eco-Mill) Plan No. 2-335, TBM, Block-3, BHEL Hardwar**

**Brief About Machine: The machine comprises of three axes and one spindle. All the three axes are controlled by DC drives, Analog copying control and analog tracer in automatic copying mode; Spindle is contactor controlled induction motor with star-delta changeover. New CNC System is to be interfaced with Analog tracer for copying of profiles and their replication on Turbine LP blades. New linear measuring system, AC servo drives and AC servo motors are to be interfaced.**

Sl. No	Description	Quantity	Accepted (Yes/No)	Deviation	Remarks
<b>1.</b>	<b>MATERIAL SUPPLY INCLUDING SCOPE OF WORK</b>				
<b>1.1.</b>	<b>CNC System Fidia C10-AF comprising of the following features:</b>	01 No.			
	The existing NC Droop & Rein system has to be replaced with Fidia C10-AF CNC Control with latest Windows XP based operating system. It should consist of operator's panel having 15 inches or larger size color display, Machine control panel PM10 and KB10 Key Board with Industrial mouse. All standard features should be listed in technical offer. Also all available optional features of Fidia C10-AF CNC system as mentioned below should be offered and included in the offer.				<u>Vendor to comply</u>
1.1.1	The CNC System should have the following features:				
1.1.2	Pentium -IV processor 2.8 GHz or of highest rating available with Fidia at the time of order.				<u>Vendor to comply</u>
1.1.3	Hard disk of 160GB or of highest rating available with Fidia at the time of order				<u>Vendor to comply</u>
1.1.4	1 GB RAM or of highest rating available with Fidia at the time of order.				<u>Vendor to comply</u>
1.1.5	USB Pen drive (Capacity: 8 GB or higher)	4 Nos.			<u>Vendor to comply</u>
1.1.6	CD R/W drive	1 No.			<u>Vendor to comply</u>
1.1.7	Digitizing, Individual axis scaling, Parametric programming & Program Error indication				<u>Vendor to comply</u>
1.1.8	Co-ordinate system transformation & rotation.				<u>Vendor to comply</u>
1.1.9	User accessible Variable Look ahead of min 200 mm NC cutter path length				<u>Vendor to comply</u>
1.1.10	Helical & Circular interpolation.				<u>Vendor to comply</u>
1.1.11	Mirroring				<u>Vendor to comply</u>
1.1.12	All standard milling cycles.				<u>Vendor to comply</u>
1.1.13	Cylindrical interpolation.				<u>Vendor to comply</u>
1.1.14	Graphic Simulation.				<u>Vendor to comply</u>
1.1.15	Background editing.				<u>Vendor to comply</u>
1.1.16	RS232-C interface, 4 USB ports, RJ45 100MBPS Ethernet Port and other standard				<u>Vendor to comply</u>

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	port(s).				
1.1.17	Auto Feed reduction for inner corners				<u>Vendor to comply</u>
1.1.18	Rotation in Space and Plane				<u>Vendor to comply</u>
1.1.19	User parameter/tool data save /restoring facility				<u>Vendor to comply</u>
1.1.20	Multiple M-codes in a single block				<u>Vendor to comply</u>
1.1.21	Canned cycles (drilling, milling, tapping & boring)				<u>Vendor to comply</u>
1.1.22	Dry run, Single block, MDI, Auto, Skip function operation				<u>Vendor to comply</u>
1.1.23	Two dimensional tool length and radius compensation				<u>Vendor to comply</u>
1.1.24	Program shift through parameter as well as by hand wheel during program execution for each Axes				<u>Vendor to comply</u>
1.1.25	Axes swapping Function				<u>Vendor to comply</u>
1.1.26	Virtual quill for movement along Tool direction.				<u>Vendor to comply</u>
1.1.27	Locking of any Axes in program and manual movements of the same axis during program execution.				<u>Vendor to comply</u>
1.1.28	DIAGNOSTIC FEATURES FOR CNC System				
1.1.28.1	Pitch error, backlash, beam sag compensation & variable backlash compensation				<u>Vendor to comply</u>
1.1.28.2	Display of input/output, memory flag, timers, parameters used in PLC on same page				<u>Vendor to comply</u>
1.1.28.3	PLC message help on-line with the display of related information like i/o hardware position, cable no, remedy with photograph of related machine part				<u>Vendor to comply</u>
1.1.28.4	On-screen help for all error messages,				<u>Vendor to comply</u>
1.1.28.5	Servo-waveform display & adjustment / servo step response function				<u>Vendor to comply</u>
1.1.28.6	Circular & linear interpolation tests with graphical study report				<u>Vendor to comply</u>
1.1.29	DIGITIZER				<u>Vendor to comply</u>
1.1.29.1	Analog Fidia Tracer (K5) with interface cables	1 Set			<u>Vendor to comply</u>
1.1.29.2	Precision at 1 mm deflection : min +/- 20 microns				<u>Vendor to comply</u>
1.1.29.3	Safety feature of possibility of re-assembly of Break points in horizontal plane.				<u>Vendor to comply</u>
1.1.29.4	Test stylus, Spanners, Breakage points (20 nos.) & Keys	1 Set			<u>Vendor to comply</u>
1.1.30	Stylii set as details below:.				
1.1.30.1	Following Special Lightweight Aluminum Stylii of following shape & sizes shall also be supplied. Stylii should be of lightweight suitable for the offered Tracer. i) Dia 20 (Ballnose) with Body length = 130mm Holding length=45mm Total Length = 175mm ii) Dia 30 (Ballnose) with Body length = 130mm Holding length=45mm Total Length = 175mm iii) Dia 40 (Ballnose) with Body length = 120mm Holding length=70mm Total Length = 190mm	1 Set			<u>Vendor to comply</u>

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	iv) Dia 50 (Ballnose) with Body length = 120mm Holding length=65mm Total Length = 185mm v) Dia 50/20 (Cyl.) with Body length = 15/50mm Holding length=30mm Total Length = 95mm vi) Dia 40/20 (Cyl.) with Body length = 15/50mm Holding length=30mm Total Length = 95mm vii) Origin set pointer dia 10mm, Total length=100mm				
1.1.31	Output data (ready to mill NC Program) in ISO format.				<u>Vendor to comply</u>
1.1.32	Tool management.				<u>Vendor to comply</u>
1.1.33	APC/ Aplab/ Luminous make 1 KVA ONLINE UPS for Automatic unattended shutdown in the case of power failure.				<u>Vendor to provide details &amp; comply</u>
1.1.34	Display of PLC Logic statement on AUCOL DEBUGGER page.				<u>Vendor to comply</u>
1.1.35	Positioning and back lash error compensations				<u>Vendor to comply</u>
1.1.36	Machine control panel PM15/01 for Mode selection, Feed override, Spindle override, Spindle Off/On, Cycle Start/Stop, Axes Jog, MPG (Electronic Handwheel) with selection Keys.	01 No.			<u>Vendor to provide details &amp; comply</u>
1.1.37	Hand-pendent with second Electronic Hand wheel and spiral cable	1 No.			<u>Vendor to provide details &amp; comply</u>
1.1.38	Fidia Input/ Output modules shall be supplied, installed & commissioned. 64 nos. of Inputs, 48 nos. of Outputs are to be programmed in the PLC maintaining the existing logic. 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. Vendor may note that logic of operation is known but no PLC program is available.	1 Set			<u>Vendor to provide details &amp; comply</u>
1.1.39	6 Nos. X 8 Channel Relay boards preferably Phoenix contact make should be provided for driving the PLC outputs to the machine. All PLC power outputs to be routed to the machine through these Relay boards.	1 Set			<u>Vendor to comply</u>
1.1.40	Existing machine logic has to be retained in new PLC program. Electrical drawing is available with us and logic has to be developed through reverse engineering.				<u>Vendor to comply</u>
1.1.41	All Softwares (Licensed copy) for taking back-up along with communication cables for data back-up & restoration to be provided.	1Set			<u>Vendor to provide details &amp; comply</u>
1.2	<b><u>DIGITIZING FEATURES</u></b>				
1.2.1	Chordal Error principle-based digitizing or equivalent (override for min pitch selected, depending on chordal error)				<u>Vendor to comply</u>
1.2.2	Self-Learn Mode with Auto Feed Reduction in complex area				<u>Vendor to comply</u>
1.2.3	Automatic Weight & Length compensation for different styli (Gain calibration cycle).				<u>Vendor to comply</u>
1.2.4	Cancellation/Compensation of Residual deflection				<u>Vendor to comply</u>

1.2.5	Digitizing modes:				<u>Vendor to comply</u>
1.2.5.1	2D Lace Cycle mode				<u>Vendor to comply</u>
1.2.5.2	2D Contour mode with and without Limit facility				<u>Vendor to comply</u>
1.2.5.3	Box Cycle mode				<u>Vendor to comply</u>
1.2.5.4	Manual Pencil Tracing mode				<u>Vendor to comply</u>
1.2.5.5	3D Free Auto Tracing mode				<u>Vendor to comply</u>
1.2.6	Digitizing Uphill and Downhill surface with inclination up to 85 deg				<u>Vendor to comply</u>
1.2.7	Limit facility : Setting of Rectangular limits as well as Setting of non-regular limit by points in Pencil mode (Limits by poly-line with different poly-line storage selection)				<u>Vendor to comply</u>
1.2.8	Scaling during digitizing				<u>Vendor to comply</u>
1.2.9	Three dimensional radius compensation to compensate the wear in tool diameter (up to 10% less in diameter)				<u>Vendor to comply</u>
1.2.10	Tracer to retract automatically to safety position & controls should be off at the end of scanning or after interruption of scanning				<u>Vendor to comply</u>
1.2.11	Auto step execution at limit line. However, Manual push button to force forward or reverse step execution during digitizing should also be available.				<u>Vendor to comply</u>
1.2.12	Digitizing on imaginary plane				<u>Vendor to comply</u>
1.2.13	Angular digitizing				<u>Vendor to comply</u>
1.2.14	Tracer deflection range				<u>Vendor to comply</u>
1.2.15	Digitizing Output data (ready to mill NC Program) to be in ISO format. Also deflection data to be output in NC file if required.				<u>Vendor to comply</u>
1.3	<b>Mechanical Work (Axes)</b>				
1.3.1	<p>The existing X, Y and Z axis ball screw with nut are to be replaced with new ones of same or more load carrying capacity. The indicative dimension of Ball screw are:</p> <ul style="list-style-type: none"> <li>• X axis: 60 mm diameter X 10 mm pitch, Screw length: 2340 mm</li> <li>• Y axis: 80 mm diameter X 10 mm pitch, Screw length: 1300 mm</li> <li>• Z axis: 60mm diameter X 10 mm pitch, Screw length 1840.</li> </ul> <p>The accuracy of the supplied Ball screw should be of C5 grade or better. The Ball screws and nuts should be of Shuton, or Rexroth makes only</p>				<u>Vendor to comply</u>

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1.3.2	<p>End support bearings of X, Y &amp; Z axis ball screw are to be replaced with the bearings of equivalent designation. Standard make like INA,FAG, RHP, TIMKEN,SKF,FAFNIR are only acceptable.</p> <ol style="list-style-type: none"> <li>1. Following bearings set are presently assembled in X axis- <ul style="list-style-type: none"> <li>• 51/53310-Qty-4 nos.</li> <li>• NU1014 P6 - Qty-02</li> <li>• 7210 B P5-Qty-02</li> </ul> </li> <li>2. Following bearings set are presently assembled in Y axis- <ul style="list-style-type: none"> <li>• 51/53310-Qty-2 nos.</li> <li>• NU1014 P6 - Qty-01</li> <li>• 7210 B P5-Qty-01</li> </ul> </li> <li>3. Similar bearing set is expected in Z axis.</li> </ol>				<u>Vendor to comply</u>
1.3.3	Scrapping and color matching of X & Y axis guide ways. Lining material of the guide ways is to be replaced. Thereafter Vendor is required to restore geometrical accuracies as per original test chart.				<u>Vendor to comply</u>
1.3.4	The gearbox of the X & Y axis is to be replaced with pulley -timing belt drive. All items required for installation of the new pulley- timing belt drive including motor flanges, pulleys, mounting brackets etc. are to be included in the scope of supply. The axes feed-rate is linearly variable from 5 mm/ min to 3000 mm/min and the same must be maintained.				<u>Vendor to comply</u>
1.4.	<b>Axes AC Servo motors (Existing Spindle motor is to be retained)</b>				
1.4.1.	<p>Suitable Siemens 1FK7 AC servo motor with holding brake for X axis to provide sufficient torque and RPM with the new pulley- timing belt system. Size constraints for the motor has to be accounted for considering the available space in the machine</p> <p>Existing motor details are: Siemens DC motor, Type no: 1GS3107-5SV41, 0.7 KW, 1000 RPM</p>	01 No.			<u>Vendor to comply</u>
1.4.2.	<p>Suitable Siemens 1FK7 AC servo motor with holding brake for Y axis to provide sufficient torque and RPM with the new pulley- timing belt system. Size constraints for the motor has to be accounted for considering the available space in the machine</p> <p>Existing motor details are: Siemens DC motor, Type no: 1GS3107-5SV41, 0.7 KW, 1000 RPM</p>	01 No.			<u>Vendor to comply</u>
1.4.3	<p>Suitable Siemens 1FK7 AC servo motor with holding brake for Z axis to provide sufficient torque and RPM with the existing gear box. Size constraints for the motor has to be accounted for considering the available space in the machine</p> <p>Existing motor details are:</p>	01 No.			<u>Vendor to comply</u>

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	Siemens DC motor, Type no: 1GS3107-5SV41, 0.7 KW, 1000 RPM				
1.4.4	The existing spindle motor has to be retained and is to be driven by motor starter with star-delta change-over. The existing motor details are: Siemens three phase induction motor 1LA4186-4AA98-Z (A11) Power: 22 KW, Voltage: 415VAC, 1500 RPM				<u>Vendor to comply</u>
					<u>Vendor to comply</u>
<b>1.5.</b>	<b>Axes AC Servo Drives</b>				<u>Vendor to comply</u>
1.5.1	Siemens make Simodrive 611U/ Sinamics AC Servo drive for Feed motor control with input voltage of 415 VAC (+/- 10%), 3 phase 3 wire system.				<u>Vendor to comply</u>
1.5.2	Vendor to include input transformer (if required)	01 No.			<u>Vendor to comply</u>
1.5.3	Servo drives to be provided with analogue speed reference 0 to +/- 10 VDC				<u>Vendor to comply</u>
1.5.4	Siemens 611U AC Servo drive for Feed motor control with input voltage of 415 VAC (+/- 10%), 3 phase 3 wire system.				<u>Vendor to comply</u>
1.5.5	Suitably rated IR module	01 Set			<u>Vendor to comply</u>
1.5.6	Suitably rated Line filter with HF Commutating Choke	01Set			<u>Vendor to comply</u>
1.5.7	Suitably rated Braking Resistor (If required)	01 No.			<u>Vendor to comply</u>
1.5.8	Suitably rated LT modules ( for X, Y, Z axis motors)	01 Set			<u>Vendor to comply</u>
1.5.9	Controller cards for X, Y & Z axes.	01 Set			<u>Vendor to comply</u>
1.5.10	Motor Encoder cables of suitable length (for X, Y & Z motors)	01 Set			<u>Vendor to comply</u>
1.5.11	Power cables for Feed motors with holding brake of suitable length ( for X, Y & Z motors)	01 Set			<u>Vendor to comply</u>
1.5.12	Power cable for spindle motor of suitable length.	01 No.			<u>Vendor to comply</u>
1.5.13	Shield terminal plates and earthing schematic for all the modules	01 Set			<u>Vendor to comply</u>
1.5.14	Drives commissioning software on CD along with interface cables for back-up purposes & demonstration of the same.	01 No.			<u>Vendor to comply</u>
<b>1.6</b>	<b>Mechanical work (Spindle Unit)</b>				
1.6.1	All the spindle bearings are to be replaced with the new bearings of equivalent designation of standard makes like INA, FAG, RHP, TIMKEN,SKF,FAFNIR,NTN only.				<u>Vendor to comply</u>
1.6.2	Accuracy of the spindle has to be restored as per the test chart provided.				<u>Vendor to comply</u>
<b>1.7</b>	<b>Machine lubrication</b>				
1.7.1	The machine is equipped with Centralized lubrication system for all the axes including Ball screw, Gear-box and end support bearings. The existing lubrication unit is of Willey Vogel make (Type no: MFE 2/BW3).This Lubrication unit has to be replaced with the similar Lubrication unit of the Willy Vogel/ Botti make and adequate capacity.	01 No.			<u>Vendor to comply</u>

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1.7.2	All the existing piping, piston distributors and cartridges throughout the machine have to be replaced with equivalent ones of reputed make and having the same capacity.	01 Set			<u>Vendor to comply</u>
1.7.3	Headstock Lubrication pump is to be replaced with equivalent one of reputed make. Existing pump is Baier Koppel Beka make (Type no: MZ6-37/A116552).	01 No.			<u>Vendor to comply</u>
1.8	<b>Coolant system</b>				
1.8.1	The existing Coolant system including Coolant pump, suitable suction filter is to be replaced with the new one of reputed make. The Coolant Pump of the existing coolant system has the pumping capacity of 45 LPM with a delivery height of 2 m water column.	01 No.			<u>Vendor to comply</u>
1.9	<b>External Measuring System-</b>				
1.9.1	X-axis scale to be installed (5V TTL output) of Heidenhain make with +/- 5 micron accuracy grade. Measuring length of scale to cover entire axis traverse and a safety margin of 100 mm or above. The Laser Calibration & Accuracy checking of the scale (if required) shall be in the scope of work.	01 No.			<u>Vendor to comply</u>
1.9.2	Y-axis scale to be installed (5V TTL output) of Heidenhain / GIVI make with +/- 5 micron accuracy grade. Measuring length of scale to cover entire axis traverse and a safety margin of 100 mm or above. The Laser Calibration & Accuracy checking of the scale (if required) shall be in the scope of work.	01 No.			<u>Vendor to comply</u>
1.9.3	Z-axis scale to be installed (5V TTL output) of Heidenhain / GIVI make with +/- 5 micron accuracy grade. Measuring length of scale to cover entire axis traverse and a safety margin of 100 mm or above. The Laser Calibration & Accuracy checking of the scale (if required) shall be in the scope of work.	01 No.			<u>Vendor to comply</u>
1.9.5	Position feedback cables from all scales to CNC system.	01 Set			<u>Vendor to comply</u>
1.9.6	Mounting brackets, mounting plates etc. for mounting of scales, transducers, of all axes and other items required for ensuring accuracy and repeatability of the feed axes movement should be included in the offer. In case any modification in the covers is required, the same shall be included in the offer.	01 Set			<u>Vendor to comply</u>
					<u>Vendor to comply</u>
1.10	<b>Electrical features</b>				
1.10.1	Operator Panel should be aesthetic & with the following features: a) Hanging Pendent type b) Height of the operator panel & display to be suitable for person of average height (5'5") c) Fitted with suitable ventilation device d) Swivel of minimum 180 degrees	01 No.			<u>Vendor to comply</u>

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	<ul style="list-style-type: none"> <li>e) Front side should have handles for rotating by hand</li> <li>f) The rear door should be on hinges and not screw mounted</li> <li>g) 220 VAC/ 5 Amp 3-pin service socket and switch (on the inside of the operator panel)</li> </ul>				
1.10.2	Design, Fabrication & mounting of suitable operator pendant, incorporating the console & associated accessories. Special care should be taken for ensuring that all the cables of the operator pendant pass through a pipe and the same needs to be maintained with no loose/ external wiring/ cabling.	01 No.			<u>Vendor to comply</u>
1.10.3	New electrical cabinet with suitable side-mounted air-conditioner to be supplied for the electrical items including Drives, LV switchgear etc. The maximum panel height should be 2 meters. The components should only be mounted on the front side only; Rear part of the panel should not have doors. Therefore the Electrical cabinet should be Oil, dust & vermin proof.	01 Set			<u>Vendor to comply</u>
1.10.4	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>Vendor to comply</u>
1.10.5	Suitable Semiconductor, HRC fuses, fuse bases of <b>GE/ SIEMENS/ BUSSMAN make</b> for overload protection.	01 Set			<u>Vendor to comply</u>
1.10.6	The complete LV switchgear of the machine including overloads, relays, contactors, MPCBs etc. is to be supplied & interfaced by the vendor as per existing scheme and of reputed makes. All AC induction motors for auxiliary functions should be wired through MPCBs.	01 Set			<u>Vendor to comply</u>
1.10.7	Electrical Cabinet to be equipped with <ul style="list-style-type: none"> <li>a) Door limit switch operated panel tube lights with by-pass switch</li> <li>b) <b>15 Amp 3-pin service socket and switch</b></li> </ul>	01 Set			<u>Vendor to comply</u>
1.10.8	Additional Keys, Push-buttons & Selector switches required on the operator panel for operation of the machine to be provided by the vendor.				<u>Vendor to comply</u>
1.10.9	All Harting connectors, Indicators, Cable Lugs, Ferrules, Plug sockets etc. used in the machine shall be replaced with new versions of reputed makes.	01 Set			<u>Vendor to comply</u>
1.10.10	DC Regulated Power Supply 24V DC, 20 Amps for all Inputs & Outputs & relay boards of <b>Siemens/Phoenix/MEANWELL/M-System make.</b>	02 Nos.			<u>Vendor to comply</u>
1.10.11	DC Regulated Power Supply 24V DC, 20 Amps for CNC system of <b>Siemens/Phoenix/MEANWELL/M-System make.</b>	02 Nos.			<u>Vendor to comply</u>
1.10.12	Sealed machine light of reputed make having halogen lamp (24 V, 70W) with electronic lamp transformer (220/24V) in working area of the machine to be installed.	02 Nos.			<u>Vendor to comply</u>
1.10.13	4 colored signal light (Tower light) display of LED type should be interfaced with PLC to	02 Set			<u>Vendor to comply</u>

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	show the operational status of the machine and visible from a distance.				
1.10.14	Wires for rewiring of the entire machine including Control cabling, signal & Power cabling (including Cabling to Spindle & feed motors). Supply to the machine will be provided by BHEL. The vendor to <b>note</b> that the entire machine has to be rewired.	01 Set			<u>Vendor to comply</u>
1.10.15	Vendor should provide the proposed electrical schematic along with bill of material to BHEL for approval prior to dispatch.	01 Set			<u>Vendor to comply</u>
1.10.16	Terminal boxes, screwed terminal blocks, bus bars, transformers etc. as required per the new electrical scheme should be provided of reputed makes viz. Wago, Connectwell, Phoenix contact etc.	01 Set			<u>Vendor to comply</u>
1.10.17	Machine should have provision to switch from direct position feedback system to indirect position feedback system (built in motor encoder) through PLC/ Custom screen which is required for service purpose only.				<u>Vendor to comply</u>
1.10.18	The manual operations as existing in the present system have to be provided through User Definable keys in the Integrated Customer Operator Panel with LED signals. Extra Push buttons & Lamps to cover all the existing manual operations shall be in the scope of supply.				<u>Vendor to comply</u>
1.10.19	Any modification/rectification of the existing mounting brackets, couplings etc. for the linear scales, encoders shall be in the scope of supply.				<u>Vendor to comply</u>
1.10.20	Fittings associated with the Mounting of the Axes drives in the suitable air-conditioned electrical cabinet are in the scope of work.				<u>Vendor to comply</u>
1.11	<b>Other Features</b>				
1.11.1	Design and supply of intermediate flanges, couplings and any other parts required for motor mounting are in the scope of supply.	01 Set			<u>Vendor to comply</u>
1.11.2	Set of keys for Electrical cabinet & Operator Panel locks	02 Sets			<u>Vendor to comply</u>
1.11.3	Lapp make hose pipes, DIN rails, Cable ducts, insulated lugs, printed ferrules and other material required for the wiring of machine and panel.	01 Set			<u>Vendor to comply</u>
1.11.4	Dismantling of the existing CNC system, Electrical cabinet, DC Drives, Motors, Proximity switches, valves, Relay cabinet & all other items needed for retrofitting of the new CNC system, Feed drives and motors, proximity switches, valves, should be carried out.				<u>Vendor to comply</u>
1.11.5	Removal of all redundant cables and devices.				<u>Vendor to comply</u>
1.11.6	Installation & Commissioning of the CNC system with prove-out of the basic & optional features of the CNC System as well as the machine functions & operations as existing presently.				<u>Vendor to provide details &amp; comply</u>
1.11.7	All the cabling in the machine including Position Feedback cables shall be replaced &				<u>Vendor to comply</u>

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	routed through the existing Cable Drag chains, routing mechanisms & their repair/replacement shall be in the scope of work.				
1.11.8	Installation & Commissioning of Axes Servo drives, & Motors.				<u>Vendor to comply</u>
1.11.9	Interfacing of the Spindle & Axes with the CNC & their proper optimization. Existing Spindle Induction motor to be maintained as it is. Suitable STAR DELTA starter to be provided and incorporated with cnc interface.				<u>Vendor to comply</u>
1.11.10	In case motor mounting requires modification/ replacement of steel telescopic covers; the same must be included in the scope of supply & telescopic covers must be of rust resistant material with wipers. Joints of telescopic covers should be so sealed to avoid coolant and other lubricating oil seepage.				<u>Vendor to comply</u>
1.11.11	Party shall supply all clamps, fixtures and fasteners required to complete the job.				<u>Vendor to comply</u>
1.11.12	Trial in automatic mode with part programs to prove all milling and handling over the machine for production.				<u>Vendor to comply</u>
1.11.13	All AC three phase motors used in the machine are to be interfaced/ incorporated in the scheme. Existing motors should be retained.				<u>Vendor to comply</u>
1.11.14	<b>All existing Proximity switches, Limit switches, pressure switches, flow switches, solenoid valves are to be replaced with 24 VDC based elements and with reputed make manufacturer.</b>	01 Set			<u>Vendor to comply</u>
1.11.15	Oil, chip & dust-proof Metallic/ PVC Cable drag chains and end covers/ brackets of IGUS/ Sur Henning/ Electromag make are to be installed to replace the existing drag chains.	01 Set			<u>Vendor to comply</u>
1.11.16	Any other material not mentioned above but found necessary to complete the job, shall be in party's scope of supply.				<u>Vendor to comply</u>
<b>1.12</b>	<b>The vendor shall be provided the machine for 15 days after placement of Work-order to ascertain exact details of material required for re-conditioning/ mechanical modifications. Vendor shall have to carry out this activity within 15 days of placement of the work order. Vendor shall have to re-assemble the machine and hand-over the machine for production after getting the necessary details.</b>				<u>Vendor to comply</u>
<b>2.</b>	<b><u>COMMISSIONING:</u></b>				
2.1.	Party shall undertake commissioning of the supplied components at BHEL, Hardwar. 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>Vendor to comply</u>
<b>3.</b>	<b><u>FINAL ACCEPTANCE:</u></b>				
3.1	Final Acceptance shall be at HEEP, BHEL, Haridwar after:				<u>Vendor to comply</u>

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	<p>a) Upon completion of the scope of supply and scope of work at BHEL.</p> <p>b) Final acceptance shall include clearance of all pending issues related to the work contract.</p> <p>c) Successful Commissioning, testing &amp; Demonstration of various cycles and control functions as envisaged in the technical scope.</p> <p>d) Successful machining of following operations on available LP blades:</p> <p>i. Tip thinning for two types of blades (5 nos. each).</p> <p>ii. Tip copying operation for two types of blades (5 nos. each).</p> <p>iii. External and Internal fillet machining for two type of blades (5nos. each). The machining of above mentioned operation in the given blades shall be carried out by generation of ready to mill NC program by digitizing</p> <ul style="list-style-type: none"> <li>• From BHEL template for operation (i) and (ii), and</li> <li>• Finished blade (master) for operation (iii).</li> </ul> <p>iv. The blank raw material, templates / finished blade (master), tools and fixture for the above shall be provided by BHEL.</p> <p>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.</p>				
4.	<b><u>DELIVERY:( IF DELIVERY PERIOD IS NOT OFFERED/ ACCEPTABLE, OFFER WILL BE REJECTED</u></b>				
	<p>i. Material: 32 weeks from the date of release of the Work order.</p> <p>ii. Work : 120 days from date of release of machine for work.</p> <p>iii. <b>Vendor to note that early delivery shall be acceptable after the date provided by BHEL at the time of order.</b></p>				<u>Vendor to comply</u>
5	<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>Vendor to comply</u>
5.2	Technical and Service manuals of the AC servomotors on CD.	03 Sets			<u>Vendor to comply</u>
5.3	Commissioning and service manuals of the AC servo drive on CD.	03 Sets			<u>Vendor to comply</u>
5.4	Commissioning and service manuals of the PLC	02 Sets			<u>Vendor to comply</u>
5.5	PLC program hard copy with comments in English & cross-reference list	03 Sets			<u>Vendor to comply</u>
5.6	PLC program on CD in installable & printable formats	01 Set			<u>Vendor to comply</u>
5.7	New Electrical schematic of the machine	03 Sets			<u>Vendor to comply</u>

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5.8	Instructions for data back-up & restoration for CNC & PLC.	03 Sets			<u>Vendor to comply</u>
5.9	Additional set of all documentation & Ghost back-up, NC/PLC/MMC Archives on CD/ DVD	01 Set			<u>Vendor to comply</u>
5.10	Documentation of all bought-out items	03 Sets			<u>Vendor to comply</u>
5.11	Bill of material & part list of all the items used on the machine	03 Sets			<u>Vendor to comply</u>
5.12	Documentation of CNC system on DVD (DOC ON DVD- User & manufacturer)	01 Set			<u>Vendor to comply</u>
6	<b><u>SPARE PARTS (TO BE COMPULSORILY QUOTED OTHERWISE OFFER WILL BE REJECTED) :</u></b>				
	Party shall compulsorily quote following spare parts:				<u>Vendor to provide details &amp; comply</u>
6.1	Controller card for X, Y & Z axes	01 No. of each type			<u>Vendor to provide details &amp; comply</u>
6.2	Motor Encoder cables as well as Linear scale cables	01 No. of each type			<u>Vendor to provide details &amp; comply</u>
6.3	Power cables for X, Y & Z axes	01 No. of each type			<u>Vendor to provide details &amp; comply</u>
6.4	Linear Scales for X, Y and Z axes	01 No. of each type			<u>Vendor to provide details &amp; comply</u>
7	<b><u>WARRANTY:</u></b>				
7.1	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>Vendor to comply</u>
8.	<b><u>TRAINING:</u></b>				
8.1	Party shall impart training to BHEL staff, for operation & maintenance of the system supplied by them during installation & commissioning.				<u>Vendor to comply</u>
8.2	Vendor to arrange 4 days training for operation,programming,Maintenance & commissioning of CNC system at CNC System manufacturer's works				<u>Vendor to comply</u>
9	<b><u>VENDOR'S OBLIGATION:</u></b>				
9.1	The vendor shall bring all tools, tackles and testing equipment with them for successful commissioning of supplied system.				<u>Vendor to comply</u>
10	<b><u>QUALIFYING CONDITIONS</u></b>				
10.1	Average Annual financial turnover during the last 3 years, ending 31st March 2013,				<u>Vendor to provide</u>

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	should be at least <b>Rs.31 Lacs</b> . Vendor should submit Audited balance sheets for the last three years.				<u>details &amp; comply</u>
10.2 (a)	<p>The Vendor must have successfully retrofitted CNC machines with any 3 axis CNC system during last seven years ending 31<sup>st</sup> March 2013 and should be either of the following:</p> <p>a. Three projects of CNC machines retrofitted with any 3 axis CNC system with each project costing not less than <b>Rs.41.0 Lacs</b>.</p> <p>or</p> <p>b. Two projects of CNC machines retrofitted with any 3 axis CNC system with each project costing not less than <b>Rs. 51.0 Lacs</b>.</p> <p>or</p> <p>c. One project of CNC machines retrofitted with any 3 axis CNC system with the project costing not less than Rs. <b>82.0 Lacs</b>.</p> <p>The above retrofitted machines should be running satisfactorily for at least 6 months prior to 31<sup>st</sup> March'2013. 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.</p>				<u>Vendor to provide details &amp; comply</u>
10.2 (b)	<p>Since Fidia is a special purpose Copying control with analog tracer based control, vendor must submit either of the following:</p> <p>1. In case the vendor has submitted CNC controls other than Fidia make against above clause 10.2(a), then the vendor should submit ' A certificate from Fidia against this tender' stating that Fidia will provide full support to the vendor for commissioning and job prove-out for successful completion of the work as per contract along with name, address &amp; contact details of Fidia. BHEL reserve right to verify the information provided.</p> <p>2. In case the CNC controls submitted against above clause 10.2(a) are Fidia CNC controls, no further certificate is required.</p>				<u>Vendor to provide details &amp; comply</u>
11	<b><u>LATE DELIVERY PENALTY (LD) CLAUSE:-</u></b>				
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</p>				<u>Vendor to comply</u>

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	only				
11.2	LD @ ½ % per week subject to a maximum of 10% of the Commissioning Charges shall be applicable for delay beyond scheduled commissioning date for reasons attributed to the party.				<u>Vendor to comply</u>
12	<b><u>PRE-DISPATCH INSPECTION</u></b>				
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>Vendor to comply</u>
12.2	Supplier shall invite BHEL for carrying out pre- inspection.				<u>Vendor to comply</u>
12.3	Deputed BHEL persons shall do pre acceptance of material under scope of supply at vendor works and give dispatch clearance.				<u>Vendor to comply</u>
12.4	Expenses of Boarding and lodging of BHEL personnel during PDI shall be borne by BHEL.				<u>Vendor to comply</u>
13	<b><u>SUBMISSION OF BILL OF MATERIAL (BOM)</u></b>				
13.1	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>Vendor to comply</u>
14	<b><u>EARNEST MONEY DEPOSIT ( EMD):</u></b>				
14.1	Vendors have to deposit <b>Rs 2.0 Lacs</b> as EMD. EMD may be deposited in cash, through pay order or through demand draft in favor of Accounts Officer, HEEP, BHEL, Haridwar only.				<u>Vendor to comply</u>
14.2	EMD shall be converted to Security deposit if the work is awarded.				<u>Vendor 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 tenderer.				<u>Vendor to comply</u>
14.4	EMD shall not carry any interest.				<u>Vendor to comply</u>
14.5	EMD by tenderer will be forfeited as per tender documents if:				<u>Vendor 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>Vendor to comply</u>
14.5.2	The tenderer does not commence the work within the period as per LOI/contract.				<u>Vendor to comply</u>
14.6	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.				<u>Vendor to comply</u>
15	<b><u>SECURITY DEPOSIT (SD):</u></b>				<u>Vendor to comply</u>
15.1	Successful vendor shall deposit security. The rate of security deposit will be as below:				
	For work Up to Rs 10 Lakhs : 10% of work order value				

	Above Rs 10 Lakhs upto Rs 50 Lakhs : Rs 1 Lakh + 7.5% amount exceeding Rs 10 Lakhs				
	Above Rs 50 Lakhs: Rs 4 Lakhs + 5% amount exceeding Rs 50 Lakhs				
15.2	The security deposit should be submitted before the start of work in the following forms:				<u>Vendor to comply</u>
	i) Cash (As permissible under the Income Tax Act)				
	ii) Pay Order, Demand Draft in favour of HEEP, BHEL, Haridwar.				
	iii) Local cheques of Scheduled Banks, subject to realization.				
	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.				
15.3	EMD of successful tenderer can be converted and adjusted against the Security Deposit.				
15.4	Security Deposit shall not carry any interest.				<u>Vendor to comply</u>
15.5	100% of the Security Deposit amount shall be refunded to the vendor after final acceptance of work. SD shall be released after the submission of Performance Bank Guarantee (PBG) by the vendor.				
16	<b><u>Performance Bank Guarantee (PBG):</u></b>				
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 for both the machines (Date of Final acceptance of last machine will be taken for this purpose).				<u>Vendor 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 nationalized banks.				<u>Vendor to comply</u>
17	<b><u>PAYMENT TERMS:</u></b> (Note: No advance payment shall be made to the vendor.)				
17.1	Part payment will be made after completion of following milestones				
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.				
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 machines (As per Clause 3). The payment shall be made subject to submission of PBG as per "Para 16".				
17.2	All the payments shall be made through e-payment after submission of following documents along with first bill				
17.2.1	E-payment form duly filled (Form will be provided by BHEL)				

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17.2.2	Income tax exemption letter( if applicable)				
17.3	Excise duty & CST/VAT will be paid on material cost and service tax will be paid on commissioning charges at actuals. Related original documents to be submitted for availing MODVAT credit by BHEL.				
18	<b>Risk Purchase Clause</b> : In case of delays in supplies / defective supplies or non-fulfillment 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>Vendor to comply</u>
19	<b>GENERAL CONDITIONS:</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 inadequate quantity can lead to dis-qualification of the offer.				<u>Vendor to comply</u>
19.2	The Vendor is advised to inspect the machine prior to quoting ascertain all the relevant details required for successful completion of the work.				<u>Vendor to comply</u>
19.3	The proposed electrical schematic & Bill of material for both the machines shall be provided by the vendor prior to pre dispatch inspection.				<u>Vendor 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>Vendor 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>Information to vendor</u>
19.6	Vendor must quote the Spare parts separately in the offer otherwise the offer will be rejected.				<u>Information to vendor</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 www.bhel.com				<u>Information to vendor</u>
19.8	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)				<u>Information to vendor</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				<u>Information to vendor</u>

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	will be ignored.				
19.10	Check List as per Annexure 'C' must be enclosed with techno-commercial bid				<u>Information to vendor</u>
20	<b><u>BHEL'S OBLIGATION/ FACILITIES:</u></b>				
20.1	Existing electrical schematic of the machines shall be provided by BHEL to the vendor.				<u>Information to vendor</u>
20.2	Crane facility along with lifting tackles, trolleys etc. will be made available free of charge while working in BHEL premises only. Any civil work required for the erection of panel shall be done by BHEL.				<u>Information to vendor</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.				<u>Information to vendor</u>
20.4	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>Information to vendor</u>
21	<b><u>OFFER:</u></b> The offer should be submitted in two parts and in following manner.				<u>Vendor to comply</u>
21.1	<b><u>Techno-commercial Bid :</u></b>				<u>Vendor to comply</u>
21.1.1	The envelop shall contain the Techno-commercial Bid (ANNEXURE 'A') 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) , Tender fees, EMD and Check List as per ANNEXURE 'C'.				<u>Vendor to comply</u>
21.1.2	The envelop shall be super scribed with "Techno-Commercial Bid", Name of work & NIT No.				<u>Vendor 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>Vendor to comply</u>
21.1.4	The vendor must note that no prices are to be quoted/ mentioned in the techno-commercial offer.				<u>Vendor to comply</u>
21.2	<b><u>Price Bid :</u></b>				<u>Vendor to comply</u>
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 ANNEXURE				<u>Vendor to comply</u>

	'B'.				
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>Vendor to comply</u>
21.2.3	The envelope shall be sealed and super scribed with "Price Bid", Name of work & NIT No.				<u>Vendor to comply</u>
21.2.4	Price bids of techno commercially accepted vendors shall be opened.				<u>Vendor to comply</u>
21.3	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 and shall be submitted in Tender Box kept in the Tender room of Purchase department at the 4th floor of the Main Administrative Building of BHEL, HEEP, Haridwar and it should also contain Bidder address.				<u>Vendor to comply</u>
<b>22</b>	<b>Commercial Terms:</b>				
22.1	Prices shall be quoted on "Firm Price" basis only. The prices should be on F.O.R BHEL, Haridwar basis inclusive of Packing & Forwarding, transit insurance & Transportation charges. Applicable % of ED & Sales Tax, Installation/ Commissioning Charges & Service Tax should be clearly indicated in attached Price bid format as per "Annexure B"				<u>Vendor to comply</u>
22.2	Validity of offer shall be for a minimum period of 120 days from the date of Tender Opening.				<u>Vendor to comply</u>
22.3	Freight & transit insurance charges from Dispatching station to BHEL, Haridwar shall be borne by the party.				<u>Vendor to comply</u>
22.4	The material will be dispatched to Sr. Manager (WEX-MCR), HEEP, BHEL, Haridwar.				<u>Vendor 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>Vendor to comply</u>

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