A. General Scope

A1.0 The scope is for the supply, installation, commissioning and training of a **4 axis CNC die sinking EDM** as per the detailed specifications furnished hereunder.

B. Specifications, terms and conditions

Sl. No.	Description	Specification
B1.0	**Axes (linear)**	
B1.1	X-Axis	400 mm (min)
B1.2	Y-Axis	300 mm (min)
B1.3	Z-Axis	300 mm (min)
B1.4	Guide ways	Linear motion guide ways for all 3axes
B1.5	Measuring system	Linear Glass Scale for X & Y axis
B1.6	X, Y & Z axes positioning resolution	0.0005 mm or better
B1.7	Drives	AC servo drives with precision ball screws for all 3axes
B1.8	Lubrication	Centralized Lubrication System
B2.0	**Integrated C – Axis**	
B2.1	C-Axis controls required	●360 deg continuous ●Shall be controlled simultaneously with all linear axes ●Shall be indexable to any programmed angle
B2.2	Rotational Speed for C axis	30 rpm or better
B2.3	Weight carrying capacity of C axis	25 kg (minimum)
B2.4	C axis positioning resolution	0.001 degree
B2.5	Spindle interface	System 3R/Erowa/Equivalent
B2.6	Simultaneous controlled axes	4 (X, Y, Z and C)
B2.7	Drives	AC servo drive
B3.0	**Accuracies of linear & rotary axes**	Linear accuracies shall be as per ISO 230-2:2012 Standard. Party shall submit a test chart of identical machine supplied recently with clear mention of achieved values.
B3.1	Positional accuracy for X,Y & Z axes	0.005 mm or better
B3.2	Repeatability for X,Y & Z axes	0.003 mm or better
B3.3	Positional accuracy for C axis	0.01degrees or better
B3.4	Repeatability for C axis	0.005 degrees or better
B3.5	Geometrical accuracies X,Y&Z	Please specify and attach typical

		factory acceptance test report as per ISO 230-1:2012 for the offered machine model/configuration
B4.0	**Work Table & Work Piece**	
B4.1	Table Size	600 x 400 mm (min)
B4.2	Work piece height-max	280 mm
B4.3	Minimum weight carrying capacity	750 kg or more
B4.4	T-slot provision for clamping purpose	Required, Vendor to confirm
B5.0	**Work Tank**	**Required**
B5.1	Type	Drop tank / Door type
B5.2	Size	Vendor to specify
B5.3	Dielectric level (Minimum/Maximum)	Vendor to specify
B5.4	Capacity	Vendor to specify
B5.5	Dielectric level adjustment	Programmable
B6.0	**Flushing Unit**	**Required**
B6.1	Injection	Programmable and synchronized with Z retraction
B6.2	Electrode injection	Required
B6.3	Work piece injection	Required
B6.4	Lateral Injection	Required
B6.5	Suction (Programmable)	Required
B6.6	Continuous high pressure injection	Required
B7.0	**Dielectric Unit**	**Required**
B7.1	Filtering quality	5 microns or better
B7.2	Dimensions of filters	Vendor to specify
B7.3	Capacity	Vendor to specify
B7.4	Flow/Discharge volume rate of filling pump	Vendor to specify
B7.5	Filtration cartridges	Vendor to specify
B7.6	Maximum temperature variation	Vendor to specify
B7.7	Automatic Dielectric cooling system / Automatic chiller unit	Required, Vendor to confirm and give details
B8.0	**Generator and performance details**	**Required**
B8.1	Discharge modes	Low wear, equal energy discharges with electrode wear less than 0.1 %
B8.2	Machining current	60 Amps or more (Shall be split modules with 30Amps standard module and 30Amps add-on

		module), The generator shall be capable of delivering MRR given in **Cl. No.B10.0**
B8.3	Discharges for fine surface finish	Required
B9.0	**Productivity and surface integrity features**	
B9.1	Automatic optimization of machining parameters during machining	Required
B9.2	Circuit for reduced wear for small electrodes	Required
B9.3	Short circuit elimination to enable higher machining speeds	Required
B9.4	Module for defining work piece surface roughness & machining parameters	Required
B9.5	Adaptive anti-arc control	Required
B9.6	Auto shut off after sparking cycle	Required
B9.7	Automatic power optimization	Required
B9.8	Auto edge and centre find for internal and external features in the job	Required
B10.0	**Material removal rate**	**Minimum required**
B10.1	Copper / Steel	410 mm^3/min or more with 60Amps
B11.0	**Best Surface Finish on job, Ra (electrode material / work piece material)**	
B11.1	Copper/Steel	0.3 µ Ra or better
B12.0	**Machining Technologies (electrode material / work piece material)**	
B12.1	Copper / Nickel alloys	Required, Vendor to comply
B12.2	Copper / Steel	
B12.3	Copper / Aluminium	
B12.4	Copper / tungsten carbide	
B12.5	Copper / copper	
B12.6	Graphite / Nickel alloy	
B12.7	Graphite / Steel	
B12.8	Graphite / Titanium alloy	
B12.9	Copper Tungsten / Steel	
B12.10	Copper Tungsten / Titanium alloys	
B12.11	Copper Tungsten / Aluminum alloy	
B12.12	Copper Tungsten / tungsten carbide	
B13.0	**CNC System**	
B13.1	Controllable axes	X,Y,Z & C
B13.2	Simultaneous controllable axis	4 axis (3 linear and 1 rotary)

B13.3	Linear Interpolation	3 out of 3 Axes
B13.4	Circular Interpolation	Any 2 axes
B13.5	Helical interpolation	Required
B13.6	Colour graphics screen	≥ 15" LCD screen
B13.7	Alphanumeric key board to select all operational modes and provision and program editing	Required
B13.8	Operating system	Windows 10 and above
B13.9	Communication ports	Multiple USB as well as LAN
B13.10	DNC communication	Required
B13.11	RAM	Vender to specify
B13.12	Data storage capacity	Vender to specify
B13.13	2D and Solid Graphic simulation of the program	Required
B13.14	In-built programming software	Required
B13.15	Positioning command format	Incremental and absolute
B13.16	Background Programming	Required
B13.17	Canned orbiting cycles	Required
B13.18	XY, XZ, YZ axes vector and orbiting	Required
B13.19	Pendent type Remote control	Required
B13.20	Onboard documentation	Vendor to specify
B13.21	Error message list	
B13.22	Maintenance book	
B13.23	Consumable list	
B13.24	ISO code	
B13.25	Machining modes	Down machining along any axis, orbital, helical, vector, corner, contouring, taper, expand etc.
B13.26	Machine should have technology for special applications such as	Machining deep ribs
B13.27	Measuring cycles for electrodes and work piece	Required, Vendor to confirm
B13.28	Restart after power Interruption	Automatic/ Manual
B13.29	System for easy programming	Required
B14.0	**Power supply**	
B14.1	Power rating in KVA	Vendor to specify
B14.2	Machine should work on AC 415V±10%, 50Hz ± 5%, 3 Phase & neutral 4 wire system	

B15.0	**Air Supply**	
B15.1	Air Pressure in bar	Vendor to specify
B15.2	Air quality	Vendor to specify
B15.3	Max. air consumption in liters / min	Vendor to specify
B16.0	**Safety**	
B16.1	The machine should be provided with all safety features to protect all parts of the machine and the operator while in operation from permissible damages/ injuries.	Required
B16.2	Safety interlocks for dielectric level and temperature.	Required
B16.3	Collision protection with warning message.	Required
B16.4	Automatic machine shutoff in case of lubrication failure with warning message.	Required
B16.5	Over travel limit for all axes with pop up message.	Required
B16.6	Compliance to any Electro Magnetic Compatibility / Electro Magnetic interference emission standards	Vendor to specify
B16.7	Work space lamp	Required
B17.0	**Technical Documentation:** Following information in full shall be submitted along with the offer:	
B17.1	Machine layout drawing indicating shop floor space and machine weight.	
B17.2	Printed catalogue of the offered machine.	
B17.3	Actual test certificate of identical machine manufactured by the manufacturer for accuracy at **Cl. No. B 3.0**	
B17.4	Details of customers to which similar machines have been supplied	
B18.0	Following technical documentation in 'English' shall be supplied along with the machine	
B18.1	Instruction/ Operational manual	
B18.2	Spare parts manual	
B18.3	Maintenance manual for mechanical, electrical/electronic systems.	
B18.4	Electrical wiring diagrams.	
B18.5	Preventive maintenance check list, trouble shooting charts and guidelines	
B19.0	**Essential Accessories/features and consumables:** Apart from all standard accessories and consumables, all following accessories/features and consumables shall be quoted.	

B19.1	Servo voltage stabilizer suitable for the offered EDM model-Brand (Console/Neel/Servomax)	1 No.
B19.2	Dialing system for work and electrode. Party has to offer dial type indicator.	1 No.
B19.3	Fume killer unit	1 No.
B19.4	Dielectric cooler/chiller unit	1 No.
B19.5	Fire protection with sensor and alarm	1 No.
B19.6	Machine Mounting pads	1 set
B19.7	Die electric fluid for initial filling	As per requirement
B19.8	Die electric Fluid for top up	210 L
B19.9	EDM compatible Machine vice with jaw width 100 mm	2 Nos.
B19.10	Set of work clamping tool kit , specify details	1 set
B19.11	Reference ball. For measuring directly and automatically the offsets X, Y, Z of the electrodes on the machine.	1 No.
B19.12	Additional/spare Dielectric Filter Cartridge for one time replacement	1 set
B19.13	Any other accessories, which may be essential for carrying the machining operation / to improve the performance of the machine.	Vendor to quote
B20.0	**Optional Accessories/ features and Consumables** (shall be quoted but optionally ordered)	
B20.1	Automatic Tool changer, specify details	1 No.
B20.2	**Other optional Accessories (System 3R or Erowa or equivalent)**	
B20.2.1	Manual chuck kit, which includes the following. a. Table chuck b. Electrode holders c. Masters d. Reference plates e. Drawbar	2 Sets
B20.2.2	Set of ER collets for clamping of electrodes (1 mm to 13 mm)	2 Sets
B20.2.3	Collet adaptor for EDM Spindle	4 Nos.
B20.2.4	Measuring sensor with ball of diameter 5 mm	1 No.

B20.2.5	Measuring sensor with ball of diameter 3 mm	1 No.
B20.2.6	Stylus for above probes 3 mm and 5 mm	1 No.
B20.2.7	Mini Collet chuck electrode holder - Circular type to hold cylindrical electrodes (0.2 mm to 2 mm)	2 Sets
B20.2.8	Set of Mini Collets - Clamping of small electrode tube (0.2 mm to 2 mm)	2 Sets
B20.2.9	Collet chuck electrode holders - Circular type to hold cylindrical electrodes 2.5 mm to 20 mm diameter	4 Nos.
B20.2.10	Set of Collets for clamping of electrodes (2.5 mm to 20 mm)	2 Sets
B20.2.11	Set of electrode holders -Rectangular type to hold rectangular electrodes up to 26.5 mm x 26.5 mm	4 Set
B20.2.12	Horizontal holder - Clamping of electrode holders in the horizontal position	2 Nos.
B20.2.13	Grease press / Grease gun - For lubrication chucks	1 No.
B20.2.14	System stand (12 fold) - For Storage of electrode holders size 50 mm.	1 Set
B21.0	**Annual service contract:** Non- Comprehensive AMC for a period of 3 years, after the expiry of the warranty period/ extended warranty period. AMC Terms & Conditions as per **Anexure-2**. Party shall quote the AMC as detailed below.	
B21.1	Cost for Non-Comprehensive AMC per year	Please quote separately
B21.2	Number of preventive maintenance per year	2 visits per year
B21.3	Breakdown maintenance	Call basis, please quote
B21.4	Cost of probable spares (Mechanical & Electrical) list with price break up valid for entire period of AMC	Please quote
B21.5	If opted for comprehensive AMC for a period of 3 years, after the expiry of the warranty period/ extended warranty period	Please quote separately with cost split-up
B22.0	**Shipment Clearance/PDI**	
B22.1	Geometrical and positioning accuracy as per **Cl. No. B3.0** tests of the machine, MRR as per **Cl. No. B10.0** and Best surface finish as per **Cl. No. B11.0** shall be performed at manufacturer's site as per their test plan.	

B22.2	VSSC reserves the right to decide the mode of despatch clearance, which is proposed to be either of the following: 1. Pre-delivery inspection of the equipment shall be carried out at manufacturer's site before despatch **or** 2. Test certificate as specified at **Cl. No. B 22.1** shall be sent to us in advance for giving clearance for shipment of machine.
B23.0	**Erection, Installation and Commissioning**
B23.1	The machine shall be erected, installed and commissioned at VSSC, Thumba, Thiruvananthapuram, Kerala- India. All necessary tools, instruments and equipments for erection, installation and commissioning of the machine shall be brought by supplier. **Cost towards erection, installation, commissioning & training etc. shall be quoted separately**.
B23.2	Party shall train 2 VSSC personnel on operation, programming and machine maintenance for 5 days after commissioning of machine at installation site free of cost.
B23.3	Party shall carry out suitable startup machining trials to demonstrate the machining technologies mentioned at **Cl. No. B 12.0** above.
B23.4	Final acceptance of the machine shall be based on satisfactory completion of the activities mentioned at **Cl. Nos. B 23.1 to B 23.3**
B23.5	Installation and commissioning and training at site shall be completed within 1 month from the date of communication from the VSSC on receipt of machine at site.
B23.6	All costs related to travel, accommodation, food, transportation during installation, commissioning and training must be borne by the supplier.
B24.0	**Other Terms and Conditions**
B24.1	Roadworthy packing of machine and its accessories is under party's scope. **Party shall also indicate packing & FOR, VSSC Thiruvananthapuram charges.**
B24.2	The supplied machine shall be warranted for a period of minimum 24 months from the date of machine acceptance at VSSC site.
B24.3	After sales service shall be provided by the party for a minimum period of 10 years from date of machine acceptance.
B24.4	Foundation requirements and special requirements like earthing for the machine including drawings should be communicated to VSSC within one month of ordering to ready the machine installation site if required. The foundation will be made ready by VSSC as per the drawing, which is to be supplied by the party.
B24.5	Party shall indicate the delivery period from the date of receipt of technical and commercial clear purchase order.
B24.6	If the machine or any part of it is lost or damaged in transit, the replacement of such machine or part shall be effected with no additional cost.

B24.7	Quotation shall be prepared and signed by the original machine manufacturer
B24.8	If bidder is not a manufacturer, bidder should attach the authorization certificate from manufacturer stating that bidder is authorized to sell and service the product offered, in India.
B24.9	The foreign machine manufacturer & supplier shall have dedicated service centre in India. The service centre should have been functioning during last 5 years and shall have proven track record of servicing. They shall have trained & experienced service personnel to provide service support. Please give complete details with documentary evidence.
B24.10	Bidder shall declare the value addition in India in terms of percentage of material and service for the equipment/systems sourced from abroad
B24.11	Bidder who is sourcing the equipment from a country which is sharing land border with India should register with DPIIT and registration details should be furnished along with the offer, without which the offer will not be considered.
B24.12	The offered machine specification, compliance matrix & catalogue specification must match.
B24.13	Criteria for price bid evaluation: - Among the listed items for price quotation, Automatic Tool Changer (s.no.15), Other optional accessories (s.no.16) and Non –comprehensive AMC for a period of 3 years (s.no.17) will not be considered to arrive at L1. Total quote for all the other items combined together (s.no.1 to 14 and s. no. 18) will be considered for L1 qualification.

C. Instructions for submitting offers

The suppliers shall submit their offers in two parts separately as under:

Part-I: Technical and commercial bid:

1. This part, **in addition to covering all technical and commercial points**, shall specifically contain the following.

1.1 Compliance matrix showing each & every tender specifications (1 to 25.6) and details of offer as per format given under. **Specific values shall be provided wherever applicable, simply replying with "complied" or "confirmed" to such clauses will not be accepted**.

Party has to provide the compliance matrix using **Annexure**

1.2 For accuracies as per **Cl. No. B3.0,** party shall submit a test chart of recently shipped identical machine.

1.3 Blank price bid without price

1.4 Documentations as per **Cl. No.B17.0**

Part-II: Price bid.

The price bid should include complete cost details and shall specifically contain the following details.

1. Price for the basic machine.
2. Price for Essential Accessories/features and Consumables as detailed in **Cl. No. B19.0**
3. Price for optional features and accessories as detailed in **Cl. No. B20.0**
4. Price for erection, installation, commissioning & training etc. **Cl. No. B23.0**
5. Price for AMC as detailed in **Cl. No. B21.0**

D. Qualification criteria for the acceptance of the offer

1. Party shall have minimum 5 installations of similar CNC die sinking EDM in last 7 years in ISRO centres or Public sector or any Government organizations in India. Party shall produce PO copy and Installation & commissioning report for the last 5 machines supplied.
2. No custom made machines are allowed, party shall only offer standard machine models prevailing in the market.
3. Test certificates (**Cl. No. B3.0** tests of the machine, MRR as per **Cl. No. B10.0** and Best surface finish as per **Cl. No. B11.0**) of the latest supplied identical/ similar machines shall be submitted.

E. Check list for submission of offers

Sl. No.	Description	Enclosed/ Not enclosed
1	Compliance matrix covering all points from **A.1** to **B24.6**	
2	Detailed technical description of machine	
3	Documentation as per **B17.0**	
4	Format of the offered price bid without price	
5	Documents / proofs for qualification criteria as detailed in **D.**	
6	Actual price bid as part of price bid (Offer with cost as part of technical bid will not be considered.)	

Annexure-2

Terms and Condition for AMC, CNC die sinking EDM

1.0 SCOPE OF WORK

1.1 Non-Comprehensive AMC includes 2 preventive maintenance visits per year with minimum duration of 2 days per visit and attending break down maintenance as and when required in the event of malfunction/breakdown of the machine.

1.2 The preventive maintenance includes the following:-

Electrical

a. Check for CNC memory, Battery and coding arrangement.
b. Check for proper voltages at test point.
c. Check for external wiring.
d. Checking for servo performance, adjust parameters and provide compensation were ever required.
e. Check and ensure the functions of end limit and emergency circuit.
f. Tune and adjust the drive parameters for all axes.
g. Check and ensure the home return sequences.
h. Check all lamps and meters.

Mechanical

a. Check for smoothness of motion of axis.
b. Check for hydraulic and dielectric lines.
c. Check for guide way and screw lubrication.
d. Check for lubrication circuits.
e. Functioning of proximity sensors.
f. Functioning of controllers
g. Mechanical system of spindle.
h. Function of belts.
i. Check and correct the source of abnormal sounds.

1.3 The preventive maintenance shall be attended between 9 am and 5 pm on all working days (Monday to Friday).

1.4 First preventive maintenance shall be carried out immediately on acceptance of the contract.

1.5 **Break down maintenance**

a) Break down call shall be attended within 48 hours of intimation by our Contact Person.
b) If replacement of any spare is required, it shall be done with the concurrence of LPSC contact person. The cost of the spares replaced shall be paid by VSSC as per the price furnished in the spares list for which party shall be requested to submit the list of spares with price breakup.
c) In case of replacement of any spares which are not listed in the spares list mentioned above or any component cannot be repaired at our premises, the same can be replaced/repaired as per the following procedure.

d) The party shall assess the condition and get the concurrence of the contact point of VSSC. Based on the assessment, the party shall submit a quote to VSSC. In case, the party is unable to submit the quotation until he receives the equipment at his premises to assess the failure, he shall provide the cost based on the probable causes of failure giving details of costing.

e) Based on the offer received, indent shall be raised with all relevant details.

f) VSSC shall place a repair order after necessary processing and approvals.

g) In case party changes any spare parts//does extra work while repairing the system at party's premises which are not covered in the said repair order, the party shall intimate VSSC about the additional work/ spare parts required over and above the those included in the order, along with charges for the same and order amendment shall be issued with necessary approvals

2.0 **PAYMENT**

Pro-rata half yearly payment shall be made after completion of each half year (pro rata payment for break down maintenance shall be made after satisfactory repair and certification by focal point and duly approved by head of the facility) against your bill along with Service Call Report duly signed by the Contact Person and countersigned by the head of the facility and sent to the Sr. Accounts Officer, VSSC, Thumba for arranging payment. Your invoice shall be in triplicate, Original to the Paying Authority, Duplicate to the Contact Person and Triplicate to your Service Engineer.

3.0 **SECURITY DEPOSIT**

On acceptance of the order, you shall submit an interest free amount equivalent to 3% of the total contract/order value towards security deposit. This security deposit is collected towards the performance of the Contract. The said Security Deposit shall be submitted either in the form of Bank Guarantee/Demand Draft/FDR receipts duly endorsed in the name of the Centre. The Security Deposit will be returned to you on successful completion of the Contractual obligations; failing which it shall be forfeited / adjusted.

4.0 **FALL CLAUSE**

The service charges quoted by you shall in no event exceed the lowest charges at which you service the machines of identical description to any other party during the period of this Contract. If at any time during the said period, you reduce the service charges of such item to any other customers, it shall be forth with done after the date of coming in to force of such reduction of service charges shall stand correspondingly reduced.

5.0 **DOWN-TIME COMPENSATION**

In case the break-down calls are not attended to within 48 hours of intimation and if reported problem is not solved within 96 hours without valid reasons, down time compensation @ 0.5% (of the annual maintenance charges) per day shall be recovered from you subject to a maximum of 5%.

6.0 **FORCE MAJEURE**

If at any time during the continuance of the order the performance in whole or part by either party of any obligation under this order shall be prevented or delayed

by reasons of any war, hostility, acts of public enemy, civil commotion, sabotage, fire, floods, lightening, epidemic, quarantine restrictions, strikes, go-slow, lockout or acts of God, notice of which is given either party to the other within 21 days from the date of occurrence thereof, neither party shall be reasons of such eventually be entitled to terminate this order nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance.

7.0 **ARBITRATION**

Dispute, If any shall be settled mutually, failing which it shall be referred to a One-Man –Arbitrator appointed by Director, VSSC in accordance with the Arbitration & Conciliation Act 1996, whose decision shall be final and binding on both parties.

8.0 **ADDITION AND DELETION**

VSSC reserve the right to add/delete any number of similar machines in this contract during the currency of the Contract.

9.0 **GENERAL**

9.1 All faults /maintenance shall be attended during the normal working hours (09.00 Hrs. to 17.00 Hrs. from Monday to Friday) of the Centre.

9.2 Service engineer who are conversant with CNC EDMs having thorough knowledge of electrical, electronic and mechanical areas shall only be deputed.

9.3 In the event of any damages to our property or personal injury to our personnel due to the negligence of your personnel, the responsibility shall solely rest with you for rectifying or compensating for the injury to our personnel.

9.4 VSSC shall not be responsible for any loss of life or injury of the service personnel while performing the contract at our premises due to natural calamities /accident/explosion etc., Hence insurance of the workers/ staff deployed against such eventualities shall be done by you positively and no compensation shall be paid by us.

9.5 You shall go through the operation logs to pin point trouble and advice the contact person how to avoid them in future.

9.6 You shall provide any clarifications required by the contact person as technical documentation.

9.7 If the machine cannot be made available by us due to workload, the re scheduled date of visit should be mutually agreed upon with the contact person.

9.8 You shall arrange for police verification of your employees and submit the report on acceptance of the contract.

9.9 You shall deploy only Indian national to our centre for servicing.

9.10 Your service person(s) should strictly comply with our security guidelines.