

**2021-22/02/18 3D Printer**

S. no.	Item	Specification
1	Model	Solid based production additive manufacturing system based on Material Extrusion technology, capable of producing parts for high temperature and strength application.
2	Technology	Should be able to build high strength, high performance and high temperature and medical grade materials. Provision for inclusion of new materials developed by R&D.
3	Machine Capability	200 mm x 170 mm x 150 mm (maximum allowable deviation 10%)
4	Minimum Build Volume (X, Y, Z)	Minimum horizontal build layer thickness 0.1 mm or better Greater/lesser than 0.1 mm can be quoted as additional features.
5	Layer Thickness	+/- 0.1 mm or better
6	Part accuracy (in all three directions)	Material handling systems should be part of the Printer with automatic material loading, feeding and storage management system. At any instance of the machine operation during idle or run time, the machine shall indicate the quantity of material available in the spool / cartridge for optimizing the material consumption.
7	Material Handling	Controlled Chamber temperature
8	Operation and Process	Material extruding nozzles should have self-cleaning mechanism
		Auto calibration of build platform for coordinates.
		Auto and manual calibration of offset between model and support nozzle.
9	Display Feature	Printing status, Material in cartridge, <b>Tip reading to indicate its life</b> , Temperature of chamber and print head/nozzle etc..
		Direct printing on base plate
10	Part building	Machine compatible of working in office/lab environments setup.
11	Facility Requirements	Noise level of the machine at the lowest level preferably 70 decibels. Relevant documentation/test results to be provided.

12	<b>MATERIAL</b>	Suitable Materials for medical, aerospace and other high performance engineering application.PEEK, Medical grade PEEK, CFR PEEK, PEI and metals. Medical grade material should be biocompatibility and sterilisation properties and Confirming ISO 10993 or equivalent standard.
13	Model Material	
14	<b>SOFTWARE</b>	Software should capable to edit the internal structure of each layer and/or group of layers of the CAD model.
15	Slicing and control	<p>Software should generate customizable build styles &amp; <b>Auto Orientation</b></p> <p>Software should provide real time part build status, time etc.</p> <p>Software should have capability to section large parts which does not fit into the build volume</p> <p>Software should be able to create stabilizing structures to support build of thin and tall geometries. And ability to put supporting structures to prevent warpage in case of large flat and bulky parts.</p> <p>Software allow the user to add various jobs to a queue for sequencing and job management</p> <p>Software should have ability to pre-program pauses on any layer of the generated slice file to add metal inserts, change color of filament.</p> <p>Software and its support/updates/upgrades should be from OEM/manufacture of the offered machine.</p> <p>License must be perpetual</p>
16	License	10/100 base T connection. Ethernet protocol
17	Networks Connectivity	Compatible with latest Windows OS
18	Workstation Compatibility	Machine should be Regulatory Compliance - CE / FCC Relevant documentation to be attached.

19	Regulatory Compliance	The machine and all the accessories supplied to meet objective should be able to operate without any risk or hazard, without any additional protection, provision, training or guarding devices and meet current international standards. Operations of machine should be in closed chamber with necessary safety measures. Chamber door must auto lock during part building.
20	Safety	
21	<b>Essential Accessories</b>	Bidder should specify and quote as per the requirement
22	Support removing system	Bidder should supply minimum quantities of consumables like build platforms, wiper blade, brush etc., required for 6 months. Also bidder should supply minimum quantity of model material each type 10 Canisters and support material each type 05 Canisters. Minimum two sets of Nozzles for different layer thickness minimum to maximum for all types of materials.
23	Consumables	Bidder should supply suitable compressor with dryer and filter units along with the machine, the compressor should have an air storage capacity that support the machine and its accessories for at least 1 hr at the time of power failure.
24	Compressor	Vendor should supply suitable de-humidifier to maintain room humidity level within suitable range for machine operation.
25	De-humidifier	Bidder to specify and quote suitable system for drying the filament
26	Filament Dryer	Bidder to specify and quote suitable system for printing of metal parts
27	Sintering & De-binding station	Vendor should supply suitable UPS with minimum 60 minutes power backup for the machine and essential accessories. Should have built in safety to protect machine from voltage spikes and sudden surges.

28	Online UPS	Bidder should supply suitable latest model OEM workstation with complete accessories and UPS for handling large size stl data (128 GB RAM, i7 or higher processor, Hard disk 5TB, 4GB dedicated Graphics card)
29	Workstation with accessories	Bidder should supply standard tool kit for startup, removal of parts and cleaning (list to be attached).
30	Tool kit	Bidder should quote and supply any other accessories for high speed printing, material transport trolleys / carts and spares required for effective and better utilization of machine.
31	Any other accessories required	Bidder should submit complete scope of supply (Machine, standard accessories, Optional Accessories etc with make model) in the technical bid without price. Bidder should supply complete start up package including material necessary to prove the machine and provide training.
32	Scope of supply	The bidder must have supplied machines at other Institutes in the past (a satisfactory performance certificate from those users may be solicited if needed). Bidder should submit complete contact details.
33	Terms & Conditions	<p>Manufacturer of the supplied equipment must be ISO Certified</p> <p>Authorization Letter from OEM</p> <p>List of clients in last five years to be provided.</p> <p>Manufacturer/Supplier should have sizable installations of same model worldwide and at least Five in India.</p>
34	<b>INSTALLATION, COMMISSIONING AND TRAINING</b>	Bidder should state the space required and condition of floor and any other requirements for installation of the machine and equipments. State clearly the specifications of electrical requirement. Vendor should carry out installation and commissioning of the machine and its accessories on a turnkey basis.
35	Installation and commissioning requirements	Minimum of 5 days training for five persons which includes basic & advanced level training. Training content and plan to be submitted. Training faculty must have adequate experience in this field.

36	Training and documentation	The vendor should supply the necessary manuals such as
		· Software instruction
		· Maintenance and trouble manual
		· Training
		· Installation and Commissioning
		· Handling of accessories
		· Software key (if any)
		· Software CDs
37	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need. Technical support personnel must have adequate experience in this field. Technical support personnel details should be submitted. Name and address of the authorized service centre/ partner in India along with the certificate of authorization should be attached.

**2021-22/02/19 3D Scanner**

S. no.	Item	Specification
1	<b>Equipment</b>	
2	Scanner type	Handheld
3	3D point accuracy, up to	0.1 mm or better
4	3D resolution, up to	0.2 mm or better
5	3D accuracy over distance, up to	(0.1 mm - 0.05 mm ) + 0.3 mm/m
6	Data processing algorithms	Geometry and texture based
7	Working distance	0.3 – 1 m
8	Volume capture zone	100,000- 150,000 cm <sup>3</sup>
9	Linear field of view, H×W @ closest range	(200-250) × (100-150) mm
10	Linear field of view, H×W @ furthest range	(700 -800) × (400 -500) mm
11	Angular field of view, H×W	(30- 40) × (20°-25°)
12	Colors	24 bpp
13	3D reconstruction rate for real-time fusion, up to	15 -20 fps
14	Data acquisition speed	15 - 25 mln points/s
15	3D exposure time	0.0002 - 0.0003 s
16	2D exposure time	0.0002 - 0.0003 s
17	3D light source	VCSEL / Flashbulb / Blue LED (or) Suitable for functioning of the equipment

<b>18</b>	2D light source	White 12 LED array/ RGB LED (or) Suitable for functioning of the equipment
<b>19</b>	Display/touchscreen	Integrated 5.5" half HD, CTP / Optional Wi-Fi/Ethernet video streaming to external device(or) USB streaming through external computer
<b>20</b>	Interface	Wi-Fi, Ethernet, SD card (or) 1 × USB 2.0, USB 3.0 compatible
<b>21</b>	Internal hard drive	256 GB SSD
<b>22</b>	Computer requirements:	
<b>23</b>	Supported OS	Data processing: Windows 7, 8 or 10 x64
<b>24</b>	computer specifications	Intel Core i7 or i9, 64GB RAM, NVIDIA GPU with 4 GB VRAM, CUDA 6.0
<b>25</b>	Output formats:	
<b>26</b>	3D mesh	OBJ, PLY, WRL, STL, AOP, ASC, PTX, E57, XYZRGB
<b>27</b>	CAD	STEP, IGES, X_T
<b>28</b>	Measurements	CSV, DXF, XML
<b>29</b>	Others:	
	The other features of the scanner HD, Hybrid geometry and texture tracking system , ability to capture texture, Built-in position sensors Embedded multi-core processing system and Built-in exchangeable battery, optional AC power	
<b>30</b>	Any other accessories required	Bidder should submit complete scope of supply (Machine, standard accessories, Optional Accessories etc with make model) in the technical bid without price. Bidder should supply complete start up package including material necessary to prove the machine and provide training.
<b>31</b>	Scope of supply	The bidder must have supplied machines at other Institutes in the past (a satisfactory performance certificate from those users may be solicited if needed). Bidder should submit complete contact details.
<b>32</b>	Terms & Conditions	Manufacturer of the supplied equipment must be ISO Certified
		Authorization Letter from OEM
		List of clients in last five years to be provided.
		Manufacture/Supplier should have sizable installations of same model worldwide and at least Fives in India.

33	<b>INSTALLATION, COMMISSIONING AND TRAINING</b>	Bidder should state the space required and condition of floor and any other requirements for installation of the machine and equipments. State clearly the specifications of electrical requirement. Vendor should carry out installation and commissioning of the machine and its accessories on a turnkey basis.
	Installation and commissioning requirements	Minimum of 5 days training for five persons which includes basic & advanced level training. Training content and plan to be submitted. Training faculty must have adequate experience in this field.
	Training and documentation	The vendor should supply the necessary manuals such as <ul style="list-style-type: none"> <li>· Software instruction</li> <li>· Maintenance and trouble manual</li> <li>· Training</li> <li>· Installation and Commissioning</li> <li>· Handling of accessories</li> <li>· Software key (if any)</li> <li>· Software CDs</li> </ul>
34	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need. Technical support personnel must have adequate experience in this field. Technical support personnel details should be submitted. Name and address of the authorized service centre/ partner in India along with the certificate of authorization should be attached.

**2021-22/02/20 CNC EDM Machine**

S. no.	Item	Specification
1	The CNC EDM with C-Axis should capable of wear free ED machining with graphite electrode and copper electrode as per the following detailed specification.	
2	Work Tank Size in mm	(800-1000) X (500- 700) X (250-450)
3	Axis Travel ( X x Y x Z) in mm	(400-500) x (300- 400) x (300-400)
4	Measurement resolution in $\mu\text{m}$	0.10 or better
5	Maximum Job weight in kg	>800

6	Max. electrode weight on automatic chuck - in kg	>50
7	Dielectric Unit	Filtration system - 10μ or better ; Flushing Injections ;
8	Generator	ISPG Integrated or better
9	Max. machining current (Option) - A	80
10	Minimum surface roughness (Ra) - in μm	0.10 or better
11	Control System	Latest with complete module CNC controller (or OEM system) and Capable storage to store large part programs for continuous running
12	Essential Accessories	
13	Automatic Tool Changer Linear or Rotary	Bidder should quote and supply OEM/well known branded with make, model and major specification
14	Rigid Linear Motor (X, Y, Z)	
15	Glass Scale Feedback (X, Y, Z)	
16	Rotary Head	
17	C Axis	
18	Super finish Module	
19	Zero Wear Module	
20	Flushing system	
21	Filter set	
22	Servo voltage stabilizer	
23	Ultra Isolation transformer	
24	Silent operation Air Compressor with drier	
25	Chiller Unit	
26	Collet holder with collet set	
27	3D probe measuring system for Erowa or System 3R	
28	Erowa or System 3R electrode holding system kit	
29	Remote controller	
30	Clamping kit	
31	Precision machine vice 4"	
32	Ethernet, USB ports, RS-232C Communication Ports	
33	Fire Extinguisher	
34	Air gun with pipe	
35	Machine lamp	
36	Dielectric fluid (400 Litre)	
37	Others	Need to specify and quote if any other accessories available /required for smooth running of the machine
		The bidder must have supplied machines at other Institutes in the past (a satisfactory performance certificate from those users may be solicited if needed). Bidder should submit complete contact details.



38	Terms & Conditions	<p>Manufacturer of the supplied equipment must be ISO Certified</p> <p>Authorization Letter from OEM</p> <p>List of clients in last five years to be provided.</p> <p>Manufacture/Supplier should have sizable installations of same model worldwide and at least Fives in India.</p>
39	Scope of supply	<p>Bidder should submit complete scope of supply (Machine, standard accessories, Optional Accessories etc with make model) in the technical bid without price. Bidder should supply complete start up package necessary to prove the machine and provide training.</p>
40	<b>INSTALLATION, COMMISSIONING AND TRAINING</b>	
41	Installation and requirements	<p>Bidder should state the space required and condition of floor and any other requirements for installation of the machine and equipments. State clearly the specifications of electrical requirement. Vendor should carry out installation and commissioning of the machine and its accessories on a turnkey basis.</p>
42	Training and documentation	<p>Minimum of 5 days training for five persons which includes basic &amp; advanced level training. Training content and plan to be submitted. Training faculty must have adequate experience in this field.</p> <p>The vendor should supply the necessary manuals such as</p> <ul style="list-style-type: none"> <li>· Software instruction</li> <li>· Maintenance and trouble manual</li> <li>· Training</li> <li>· Installation and Commissioning</li> <li>· Handling of accessories</li> <li>· Software key (if any)</li> <li>· Software CDs</li> </ul>
43	Warranty	<p>The whole system and its accessories should be given three years warranty for replacement and service against any design, manufacturing and workmanship defects from the date of installation and commissioning.</p>

44	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need. Technical support personnel must have adequate experience in this field. Technical support personnel details should be submitted. Name and address of the authorized service centre/ partner in India along with the certificate of authorization should be attached.
45	Annual Comprehensive Maintenance Contract (ACMC) as optional	Vendor should quote for Annual Comprehensive Maintenance Contract for the whole system and accessories supplied after the completion of performance warranty period. Supplier has to provide service support within 48 hours. Calibration of the machine shall be a part of warranty and ACMC. It shall also be mandatory to perform calibration after every major repair or breakdown

**2021-22/02/21 CNC Coordinate Measuring Machine (CNC-CMM)**

S. no.	Item	Specification
1	Axis Travel	
2	X-Axis (mm)	600 - 700
3	Y-Axis (mm)	600-800
4	Z-Axis (mm)	500-600
5	Accuracy	2.2+ L/350) µm or Better
6	Scale Resolution	0.1 µm or Better
7	Table	Granite
8	Screw air compressor with dryer	Bidder to specify and quote suitable system
9	Table Load Capacity	500 kg or Better
10	Max Velocity Vector	600 mm/sec or Better
11	Max. Acceleration Vector	600 mm/sec <sup>2</sup> or Better
12	Control System	5-Axis CNC System + Servo Amplifiers + Joystick unit with accessories
13	Probe Kit	Probe head should be motorised capable of indexing in two directions. Renishaw (PH 20) Latest 5 axis infinite positioning probe head + TP20 module + Set of Styli of different sizes
14	Measuring and control Software	Should quote complete modules of software in latest version

15	Computer System with measuring & Analysis software	Bidder should specify and Quote Suitable system and latest complete module of software for control, measure and analysis. Measurement of known/ unknown contour, comparison of contour, Development of 2D profile, Multi tolerance facility on the single contour, Export/Import of 2D contour in DXF, IGES & STEP format. Report in different format like txt, PDF, Excel, HTML, Element graphic view, multiple graphic view.
16	Essential accessories	
17	Voltage Stabilizer	Bidder should specify and Quote Suitable system for the CNC CMM
18	Silent operation air compressor with Drier and necessary accessories	
19	UPS	
20	Printer	
21	Clamping kit	
22	Any other accessories if available for better utilization	Bidder to specify and quote if any other accessories available /required for smooth running and better utilization of the machine.
23	Terms & Conditions	
	The bidder must have supplied machines at other Institutes in the past (a satisfactory performance certificate from those users may be solicited if needed). Bidder should submit complete contact details.	
	Manufacturer of the supplied equipment must be ISO Certified	
	Authorization Letter from OEM	
	List of clients in last five years to be provided.	
Manufacture/Supplier should have sizable installations of same model worldwide and at least Fives in India.		
24	Scope of supply	Bidder should submit complete scope of supply (Machine, standard accessories, Optional Accessories etc with make model) in the technical bid without price. Bidder should supply complete start up package necessary to prove the machine and provide training.
25	<b>INSTALLATION, COMMISSIONING AND TRAINING</b>	

26	Installation and commissioning requirements	Bidder should state the space required and condition of floor and any other requirements for installation of the machine and equipments. State clearly the specifications of electrical requirement. Vendor should carry out installation and commissioning of the machine and its accessories on a turnkey basis.
27	Training and documentation	<p>Minimum of 5 days training for five persons which includes basic &amp; advanced level training. Training content and plan to be submitted. Training faculty must have adequate experience in this field.</p> <p>The vendor should supply the necessary manuals such as</p> <ul style="list-style-type: none"> <li>· Software instruction</li> <li>· Maintenance and trouble manual</li> <li>· Training</li> <li>· Installation and Commissioning</li> <li>· Handling of accessories</li> <li>· Software key (if any)</li> <li>· Software CDs</li> </ul>
28	Warranty	The whole system and its accessories should be given three years warranty for replacement and service against any design, manufacturing and workmanship defects from the date of installation and commissioning.
29	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need. Technical support personnel must have adequate experience in this field. Technical support personnel details should be submitted. Name and address of the authorized service centre/ partner in India along with the certificate of authorization should be attached.

<b>30</b>	Annual Comprehensive Maintenance Contract (ACMC) as optional	Vendor should quote for Annual Comprehensive Maintenance Contract for the whole system and accessories supplied after the completion of performance warranty period. Supplier has to provide service support within 48 hours. Calibration of the machine shall be a part of warranty and ACMC. It shall also be mandatory to perform calibration after every major repair or breakdown
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**2021-22/02/22 CNC Lathe (CNC Turning Centre)**

S. no.	Item	Specification
<b>1</b>	<b>Capacity</b>	
1.1	Swing over bed - in mm	450-550
1.2	Swing over carriage - in mm	200-300
1.3	Max. turning diameter - in mm	250-300
1.4	Max. turning length - in mm	400-450
1.5	Distance between centres - in mm	400-500
<b>2</b>	<b>Travel</b>	
2.1	X-Axis Travel (Cross) - in mm	150-200
2.2	Z-Axis Travel (Longitudinal) - in mm	400-450
<b>3</b>	<b>Main Spindle</b>	
3.1	Spindle motor Power - in KW	7.5 or better
3.2	Max. Speed- rpm	4000 or better
3.3	Spindle Bore - in mm	50-60
3.4	Spindle Nose	A2-5
<b>4</b>	<b>Feed Rate</b>	
4.1	Rapid Traverse X axis - mts./min	20 or better
4.2	Rapid Traverse Z axis - mts./min	20 or better
4.3	Feed Rate	5000 or better
<b>5</b>	<b>Turret</b>	
5.1	No. of station - nos.	12 or better
5.2	Tool shank size - in mm	20x20 or better
5.3	Boring bar dia. - in mm	32 or better
5.4	Turret indexing	Bi Directional
<b>6</b>	<b>Tailstock</b>	
6.1	Quill dia - in mm	60-80
6.2	Quill stroke - in mm	100-120
6.3	Quill taper	MT4 or better
<b>7</b>	<b>CNC System</b>	
7.1	Controller	Siemens/Fanuc (Latest with complete module)
7.2	Part Program Storage - Gb	Capable to store large CAM programs for continuous running
7.3	Programming Functions with editor	Complete module
<b>8</b>	<b>Accuracy</b>	
8.1	Positioning uncertainty - $\mu\text{m}$	5

8.2	Overall Axis Repeatability (X, Z) - $\mu\text{m}$	5
8.3	Part Surface Finish - $\mu\text{m}$	5
8.4	Roundness - $\mu\text{m}$	5
8.5	Turret Indexing Repeatability - $\mu\text{m}$	5
9	<b>Essential Accessories</b>	
9.1	Programmable Tailstock with sleeves	one No.
9.2	Automatic Tool setter	one No.
9.3	Hydraulic 3 Jaw Chuck	one No.
9.4	Hydraulic 4 Jaw Chuck	one No.
9.5	Soft Jaws	two sets
9.6	Drill Chuck	one No.
9.7	Hydraulic Collet chuck with set of collets	One with various sizes
9.8	Set of standard Cutting Tools with holder for replaceable inserts (for Facing, Turning, boring, threading, grooving, parting, drilling etc)	Various operation suitable various size of jobs each one No. Drills- Centre Drill and 1to 20 mm drills
9.9	Coolant System	Bidder to specify and quote suitable for the machine
9.10	Start up Tool kit	Bidder to specify and quote suitable for the machine
9.11	Foot switch	Bidder to specify and quote suitable for the machine
9.12	Work light	Bidder to specify and quote suitable for the machine
9.13	Centralized lub. System	Bidder to specify and quote suitable for the machine
9.14	Set of Rubber mounts	Bidder to specify and quote suitable for the machine
9.15	Voltage Stabilizer	Bidder to specify and quote suitable for the machine
9.16	Ultra Isolation transformer	Bidder to specify and quote suitable for the machine
9.17	Others	Ethernet, USB ports, RS-232C
10	<b>Any Others Accessories</b>	Bidder to specify and quote if any other accessories available /required for smooth running of the machine.
13	Terms & Conditions	<p>Manufacture/Supplier should have sizable installations of same or better model worldwide and at least Five in India which is education institutions centrally funded institution. A Satisfactory Performance certificate from two institutions to be provided for eligibility. Bidder should submit complete contact details</p> <p>Equipment should be CE certified</p> <p>Authorization Letter from OEM</p>

		List of clients in last five years to be provided.
14	Scope of supply	Bidder should submit complete scope of supply (Machine, standard accessories, Optional Accessories etc with make model) in the technical bid without price. Bidder should supply complete start up package necessary to prove the machine and provide training.
15	<b>INSTALLATION, COMMISSIONING AND TRAINING</b>	
15.1	Installation and commissioning requirements	Bidder should state the space required and condition of floor and any other
15.2	Training and documentation	Minimum of 5 days training for five persons which includes basic & advanced level training. Training content and plan to be submitted. Training faculty must have adequate experience in this field.
		The vendor should supply the necessary manuals such as
		· Software instruction
		· Maintenance and trouble manual
		· Training
		· Installation and Commissioning
		· Handling of accessories
15.3	Warranty	· Software key (if any)
		· Software CDs
15.3	Warranty	The whole system and its accessories should be given two years warranty for the machine and three years for the spindle replacement and service against any design, manufacturing and workmanship defects from the date of installation and commissioning.
15.4	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need. Technical support personnel must have adequate experience in this field. Technical support personnel details should be submitted. Name and address of the authorized service centre/ partner in India along with the certificate of authorization should be attached.

15.5	Annual Comprehensive Maintenance Contract (ACMC) as optional	Vendor should quote for Annual Comprehensive Maintenance Contract for the whole system and accessories supplied after the completion of performance warranty period. Supplier has to provide service support within 48 hours. Calibration of the machine shall be a part of warranty and ACMC. It shall also be mandatory to perform calibration after every major repair or breakdown
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### 2021-22/02/23 CNC Machining Centre

S. no.	Item	Specification
1	<b>Axis Travel</b>	
2	X-Axis (mm)	1000-1200
3	Y-Axis (mm)	600-700
4	Z-Axis (mm)	600-700
5	<b>Table</b>	
6	Length (mm)	1200-1400
4	Width (mm)	600-800
7	T-Slot Width (mm)	14-16
8	Number of Std T-Slots	5 or more
9	<b>Feed</b>	
10	Rapid Feed (X, Y,Z Axes) (m/min)	20 or better
11	Max. Cutting Feed (X, Y,Z Axes) (m/min)	10 or better
12	<b>Spindle</b>	
13	Rating (KW)	Bidder to specify
14	Max. Speed (rpm)	8000 or better
15	Taper	BT40
16	<b>Accuracy</b>	
17	Positioning ( $\mu\text{m}$ )	10 or better
18	Repeatability ( $\mu\text{m}$ )	5 or better
19	<b>Automatic Tool Changer</b>	
20	Magazine capacity (Nos)	20 or better
21	Tool select by shortest & Random select	Bi-Directional
22	Max. tool diameter (mm)	80 or better
23	<b>Control System</b>	
24	Controller	Fanuc / Siemens / or equivalent (Latest with complete module )
25	Part Program Storage (GB)	Capable to store large CAM programs for continuous running (Minimum 4 GB)
26	Programming Functions with editor	Complete Module with technical calculator for power and torque requirements , with dxf file import facility, 3D simulation
27	<b>Essential Accessories</b>	



28	Servo stabilizer	Bidder to specify and quote suitable for the machine
29	Ultra Isolation transformer	Bidder to specify and quote suitable for the machine
30	Air Compressor with drier and multi dry filter	Bidder to specify and quote suitable for the machine
31	Automatic centralized lubrication system	Bidder to specify and quote suitable for the machine
32	Touch Probe	Bidder to specify and quote Branded quality(Renishaw / Blum) Touch Probe
33	Machine protection	Monitoring vibration during machining to protect machine and spindle failure. User autorisation to the control system and the machine. Safety during power failure and Panel cooler for electrical cabinet. Door interlock for safety
34	Industry 4.0 features leads to smart machine	Live status of important component of the machine in operation, internet based remote diagnosis of the machine like fault on the machine
35	Operation hardware	Electronic handwheel, Flushing gun for internal cleaning, Coolant tank with chip conveyor
36	Tool holding devices	<p>Bidder to specify and quote Set of suitable Cutting Tool holders</p> <p>ER 10 Extended collet chuck -1 No.</p> <p>ER 10 collets Dia 1.0 to Dia 10.0 in steps of 1mm - 1 each</p> <p>ER 25 collet chuck -1 No.</p> <p>ER 25 collets Dia 3 to Dia 14 in steps of 1mm - 1 each</p> <p>ER 32 collet chuck - 1 No.</p> <p>ER 32 collets Dia 10 to Dia 20 in steps of 1mm - 1 each</p> <p>ER 40 collet chuck -1 No.</p> <p>ER 40 collets Dia 20 to Dia 25 in steps of 1mm - 1 each</p> <p>ER 25 Tap collets with square drive for M6 to M10 taps- 1 each</p> <p>ER 32 Tap collet with square drive for M12 tap-1 each</p> <p>Side lock adaptors Dia 16, 20, 25 &amp; 32 -1 each</p> <p>Keyless drill chuck 0-13mm (with adapter)</p> <p>ER 40 Taper Shank adapter (Three Ranges)</p> <p>Holder (adapter) for 40 mm Face mill - 1 No</p> <p>Holder (adapter) for 80 mm Face mill - 1 No</p> <p>Holder (adapter) for 125 mm Face mill - 1 No</p> <p>Holder (adapter) for 50 mm Bull - 1 No</p> <p>Tool locking device-1 No.</p>

37.00	Cutting Tools	<p>Bidder to specify and quote Set of Cutting  Face mill cutter (with replaceable inserts 20 nos.) - Dia 80 mm  Bull nose cutter (with replaceable inserts 20 nos)- Dia 50 mm  End Mill cutter (with replaceable inserts 20 nos)- Dia 32 mm  Bull nose cutter (with replaceable inserts 20 nos)- Dia 25 mm  Endmill cutter (with replaceable inserts 20 nos)- Dia 20 mm  Endmill cutter (with replaceable inserts 20 nos)- Dia 16 mm  carbide End Mill cutter (each two)- Dia. 3, 4, 5, 6, 8, 10, 12, 16 mm  carbide Ball End Mill cutter (each two)- Dia. 3, 4, 5, 6, 8, 10, 12, 16 mm  M6, M8, M10,M12 HSS Tap with suitable  Carbide Drills - 2 Sets  Dia. 5, 6, 8, 10 and 12 mm HSS Reamers with suitable Drills - 2 Sets  HSS Drills ( one set) - Dia. 1 to 20 mm  Centre Drill (Carbide &amp; HSS) - each 3 Diff. Sizes  Finish boring kit dia 10 to 40- 1 set</p>
38	Clamping Kit	<p>Clamp set  Precision Hydraulic Vise with jaw opening of 275 mm and clamping force 60 KN - I No  3 Jaw chuck - 300 mm dia - 1 no..</p>
39	Others	<p>RS 232 Ports with fabricated data cable (20 meters), Ethernet, USB ports</p>
40	Software	<p>CAM software with post processor suitable for the machine to be quoted seperately and transfer media software for RS 232 connections</p>
41	Any other accessories if available for better utilization	<p>Bidder to specify and quote if any other accessories available /required for smooth running and better utilization of the machine.</p>
42	Terms & Conditions	<p>Manufacture/Supplier should have sizable installations of same or better model worldwide and at least Five in India which is education institutions centrally funded institution. A Satisfactory Performance certificate from two institutions to be provided for eligibility. Bidder should submit complete contact details</p> <p>Equipment should be CE certified</p>

		Authorization Letter from OEM
		List of clients in last five years to be provided.
43	Scope of supply	Bidder should submit complete scope of supply (Machine, standard accessories, Optional Accessories etc with make model) in the technical bid without price. Bidder should supply complete start up package necessary to prove the machine and provide training.
44	<b>INSTALLATION, COMMISSIONING AND TRAINING</b>	
45	Installation and commissioning requirements	Bidder should state the space required and condition of floor and any other requirements for installation of the machine and equipments. State clearly the specifications of electrical requirement. Vendor should carry out installation and commissioning of the machine and its accessories on a turnkey basis.
46	Training and documentation	Minimum of 5 days training for five persons which includes basic & advanced level training. Training content and plan to be submitted. Training faculty must have adequate experience in this field.
		The vendor should supply the necessary manuals such as
		· Software instruction
		· Maintenance and trouble manual
		· Training
		· Installation and Commissioning
		· Handling of accessories
		· Software key (if any)
· Software CDs		
47	Warranty	The whole system and its accessories should be given two years warranty for the machine and three years for the spindle replacement and service against any design, manufacturing and workmanship defects from the date of installation and commissioning.

48	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need. Technical support personnel must have adequate experience in this field. Technical support personnel details should be submitted. Name and address of the authorized service centre/partner in India along with the certificate of authorization should be attached.
49	Annual Comprehensive Maintenance Contract (ACMC) as optional	Vendor should quote for Annual Comprehensive Maintenance Contract for the whole system and accessories supplied after the completion of performance warranty period. Supplier has to provide service support within 48 hours. Calibration of the machine shall be a part of warranty and ACMC. It shall also be mandatory to perform calibration after every major repair or breakdown

**2021-22/02/24 CNC Wirecut EDM**

S. no.	Item	Specification
1	Type - Submerged	Submerged
2	Dimensions of table - mm	(800 - 1000) x (500-700)
3	Axis Travel (X x Y x Z) , U&V Travel - mm	(500- 600) x (400-500 ) x ( 300 -450), 75 or better
4	Taper angle and Height - 0/ mm	±15 / 100 or better
5	Wire Characteristics	Dia. 0.25 mm ; Type of wire guide - Closed diamond type without clearance ; Protection against electrolytic effects- From roughing through to finishing;
6	Max. cutting speed - mm <sup>2</sup> /min	120 or Better
7	Max. weight of the workpiece - Kg	>400
8	Max. Machining current - A	25 or better
9	Min. finishing (Ra) - μm	0.25 or better
10	Position measurement system / Measurement resolution - μm	0.1 or better
11	Architecture	Std Input & output accessories- LCD 15" TFT
12	Control System with software	Latest with complete module CNC controller
13	<b>Essential Accessories</b>	
13.1	Chiller Unit	
13.2	Wire chopper	
13.3	Servo stabilizer	

13.4	Ultra Isolation transformer	Bidder should quote and supply OEM/well known branded with make, model and major specification
13.5	Silent operation Air Compressor with drier	
13.6	Air gun with pipe	
13.7	Holding & Clamping Kit (Such as vice, angle plate, v block, c clamp etc.)	
13.8	Consumables	Minimum 10 Spools of coated wire and
13.9	Filters	2 sets of 10 micron filters or better
13.10	Workstation	Suitable latest workstation for part
14	Others	Bidder to specify and quote if any other
15	Terms & Conditions	The bidder must have supplied machines at
		Manufacturer of the supplied equipment
		Authorization Letter from OEM
		List of clients in last five years to be Manufacture/Supplier should have sizable
16	Scope of supply	Bidder should submit complete scope of
17	<b>INSTALLATION, COMMISSIONING AND TRAINING</b>	
	Installation and requirements	Bidder should state the space required and
17.2	Training and documentation	Minimum of 5 days training for five persons
		The vendor should supply the necessary
		· Software instruction
		· Maintenance and trouble manual
		· Training
		· Installation and Commissioning
		· Handling of accessories
		· Software key (if any)
· Software CDs		
17.3	Warranty	The whole system and its accessories should
17.4	Technical support and service	Manufacturer should have established after
17.5	Annual Comprehensive Maintenance Contract (ACMC) as optional	Vendor should quote for Annual Comprehensive Maintenance Contract for the whole system and accessories supplied

### 2021-22/02/25 Rapid Prototyping Machine SLA Printer

S. no.	Item	Specification
1	Processing Unit	
1.1	Technology	Liquid based additive manufacturing system based on Stereolithography process
1.2	Minimum Build Volume (X, Y, Z)	600 mm x 600 mm x 400 mm or larger with XY axis control
1.3	Resin Vat	Resin VAT with in-built heating module and inter-changeable VAT mechanism
1.4	Process Chamber	Automatic resin level sensor, resin heating and re-coater system with solid platform
1.5	Building Platform	Stainless steel, perforated and reinforced platforms

1.6	Positioning	Precision positioning on all axis
1.7	Recoating System	Automatic, active recoater blade with volume status monitor and control
		Minimum layer thickness 0.05 to 0.25 mm or better
		Self leveling and self correcting of the resin inside the recoater
1.8	Laser	<b>one or two</b> Diode pumped Solid state laser Nd:YVO4 with 355nm wave length or Better/equivalent
		<b>Laser power 3000mW or better/Suitable for the machine</b>
1.9	System Monitor and control Unit	Windows based Industrial Computer system and printer OS
1.1	Scanning Strategy	Should support variable beam ( laser facula size of 0.08 mm to 0.8 mm) for fast built with different facula size for contour and infill section to achive better surface quality and faster productivity. The scanning speed should be 6 m/s to 10 m/s or better
1.11	XY Resolution	3800 DPI or 150 μ or better
	<b>Layer resoution</b>	<b>25 micron</b>
1.12	Accuracy	0.1 mm for part size of 100 mm or 0.1% of part size excess of 100 mm size <b>in xy and z axis</b>
2	Material	
2.1	Material	Must have OEM and authorized materials from suppliers of repute, must have the ability to fabricate parts using rigid & durable (ABS like), Transparent and suitable for investment casting (PC like), durable and other materials (High Temperature, Flexible..) and submit quote separately for each materials as option.
		Machine should have the provision of testing materials developed by the user and professional guidance should be given to adhere to the system compatibility and configuration
		Bidder should also supply proven parameters for all the suitable materials with clear documentation and statistics of the mechanical properties with respect to build orientation and layer thickness.

2.2	Customised material guidance	Machine should have the provision of testing materials developed by the user and professional guidance should be given to adhere to the system compatibility and configuration
2.3	Data sheet (MDS)	MSDS or material data sheet must be submitted for materials to be submitted
3	Software	
3.1	System control Software	Capable for 3D view, manage and printing of Jobs and must have OEM partnership with the software company for future support and upgrades. OEM certificate must be submitted along with the supporting document
3.2	Part Preparation and machine control Software	Complete module for conversion of part data in the STL format and optimization of layer data.
3.3	Parameter editor	The Printer software must support an open architecture to allow modification and other process parameters for all quoted or future materials.
3.4	License	License must be perpetual
4	<b>Essential Accessories</b>	
4.1	Curing Chamber	Bidder should specify and quote suitable post curing chamber
4.2	Interchangeable Material tray	Bidder should specify and quote additional resin VAT with lifting system with required accessories
4.3	Sand Blaster	Bidder should specify and quote
4.4	Support removal	Bidder should specify and include accessories/ tools for manual support removal of parts and cleaning
4.5	De-humidifier	Vendor should supply suitable de-humidifier to maintain room humidity level within suitable range for machine operation.
4.6	Online UPS	Vendor should supply Branded UPS with minimum 60 minutes power backup <b>suitable</b> for the machine and essential accessories. Should have built in safety to protect machine from voltage spikes and sudden surges.

4.7	Workstation with accessories	Bidder should supply suitable latest model workstation with complete accessories for handling large size STL data (Xeon Silver 4108 Processor or higher, Win 10 Pro, RAM: 128GB DDR4, NVIDIA Quadro P1000 4GB, 5 TB Hard Drive, Monitor, Keyboard, min. 3 Years Warranty)
4.8	Compressor	<b>Branded compressor suitable for SLA</b>
4.9	Tool kit	Vendor should supply standard tool kit for startup, removal of parts and cleaning (list to be attached).
4.9	Design, Analysis & Optimisation software (Research Version & License must be perpetual) - <b>Bidder must quote AMC cost separately for each item</b>	<b>Solid Works - Design complete module Materialise software for additive manufacturing - SLS Slice &amp; Sinter module, Simulation module, e-Stage modules- Polymer &amp; Metal, Inspector, 3matic modules - Design, Latice, Remesh, Texturing, CAD Link.</b>
4.1	Any other accessories required	Vendor should supply all the other accessories, material transport trolleys / carts and spares required for effective and better utilization of machine. All the required accessories should be listed <b>and quoted separately</b>
6	Other essential requirements	
6.1	Safety	The machine and all the accessories supplied to meet objective should be able to operate without any risk or hazard, without any additional protection, provision, training or guarding devices and meet current international standards. Operations of machine should be in closed chamber with necessary safety measures. Chamber door must auto lock during part building.
6.2	Other Conditions	The bidder must have supplied at least 10 such machines of similar capacities with in India including OEM Installations in the past. A satisfactory performance certificate from those users may be solicited if needed. Bidder should submit complete contact details.
		Manufacturer of the supplied equipment must be ISO/ CE/FDA approved
		Bidder must submit Authorization letter form OEM of Printer, materials and software



6.3	Scope of supply	Bidder should submit complete scope of supply (Machine, standard accessories, Optional Accessories etc with make model) in the technical bid. Bidder should supply complete start up package including material necessary to prove the machine and provide training.
7	Installation, Commissioning and Training	
7.1	Installation and commissioning requirements	Bidder should state the space required and condition of floor and any other requirements for installation of the machine and equipments. State clearly the specifications of electrical requirement. Vendor should carry out installation and commissioning of the machine and its accessories on a turnkey basis.
7.2	Training and documentation	<p>Minimum of 5 days training for five persons which includes basic &amp; advanced level training. Training content and plan to be submitted. Training faculty must have adequate experience in this field.</p> <p>The vendor should supply the necessary manuals such as</p> <ul style="list-style-type: none"> <li>· Software instruction</li> <li>· Maintenance and trouble manual</li> <li>· Training</li> <li>· Installation and Commissioning</li> <li>· Handling of accessories</li> <li>· Software key (if any)</li> </ul>
7.3	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 24 hours of need. Technical support personnel must have adequate experience in this field. Technical support personnel details should be submitted. Name and address of the authorized service centre/ partner in India along with the certificate of authorization should be attached.

7.4	Annual Comprehensive Maintenance Contract (ACMC)	Vendor should quote for Annual Comprehensive Maintenance Contract separately for the whole system and accessories supplied after the completion of performance warranty period. Supplier has to provide service support within 24 hours. Calibration of the machine shall be a part of warranty and ACMC. It shall also be mandatory to perform calibration after every major repair or breakdown.
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### 2021-22/02/26 ROBOTICS

S. no.	Item	Specification		
1.1	Make	Bidder to specify		
1.2	Model	Bidder to specify		
2.	Type	Articulated robot		
Specifications of Robot Arm:				
3.	Degree of freedom	6 Axes		
4.	Axis specification	Operating axis	Max. operating range	Max. speed
		Arm rotation - (JT1)	from +170° to -170°	175 ° /s
		Arm out-in - (JT2)	from -95° to +155°	175 ° /s
		Arm up-down - (JT3)	from -95° to +170°	170 ° /s
		Wrist swivel - (JT4)	from +185° to -185°	360 ° /s
		Wrist bend - (JT5)	from +135° to -135°	360 ° /s
		Wrist twist - (JT6)	from +400° to -400°	600 ° /s
5.	Repeatability	±0.05 mm or better		
6.	Max. payload	20 kg - 25 kg		
7.	Reach	1500 - 2000 mm		
8.	Number of controlled axes	Max.6 axes		
9.	Servo control and drive system	Full Digital Servo System		
10.	Controller	KIBA / FANUC or Equivalent		
11.	Programming Language	C++ / Python		

12.	Type of control	Teach mode	Joint, Base, Tool, Fixed Tool (option) operation mode	
		Repeat mode	PTP, CP control mode	
			Joint, Linear, Circular (option) interpolation	
13.	Driving motor	Brushless AC Servomotor or equivalent		
14.	Installation	Floor or Ceiling mounting		
15.	Degree of protection	IP54 or better		
16.	Memory capacity	8 MB		
17.	Applications:	For shop floor environment - Assembly, Fastener fixing,		
18.	Essential Accessories	Bidder should quote and supply OEM/well known		
19.	Others	Bidder to specify and quote if any other accessories		
20	Terms & Conditions	The bidder must have supplied machines at other		
		Manufacturer of the supplied equipment must be ISO		
		Authorization Letter from OEM		
		List of clients in last five years to be provided.		
21	Scope of supply	Bidder should submit complete scope of supply		
22	<b>INSTALLATION, COMMISSIONING AND TRAINING</b>			
22.1	Installation and requirements	Bidder should state the space required and condition of		
22.2	Training and documentation	Minimum of 5 days training for five persons which		
		The vendor should supply the necessary manuals such		
		· Software instruction		
		· Maintenance and trouble manual		
		· Training		
		· Installation and Commissioning		
		· Handling of accessories		
· Software key (if any)				
· Software CDs				
22.3	Warranty	The whole system and its accessories should be given		
22.4	Technical support and service	Manufacturer should have established after sales &		
22.5	Annual Comprehensive Maintenance Contract (ACMC) as optional	Vendor should quote for Annual Comprehensive Maintenance Contract for the whole system and accessories supplied after the completion of		