



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

Powai, Mumbai 400076.

Ref No.(1000050063)

(Rfx No. 6100002456)

Technical Specifications : 3D Printer (Qty : 1)

Sr. No	Item Description	Detailed Technical Specification	Technical Compliance (Yes / No)	Additional Information (if any)
1	3D Printer:			
1.1	Printing Process/ Technology	Laser Powder Bed Fusion Metal 3D printing		
1.2	Build Volume	Larger than or equal to 200 mm*200 mm with 250 mm height		
1.3	Layer Thickness	Min. 20 microns		
1.4	Pre-heating of build platform	200°C or more		
1.5	Build chamber atmosphere	The machine should have the option to operate both Nitrogen and Argon atmosphere based on the materials to be printed		
1.6	Max scanning speed	7 m/sec or higher		
1.7	Position repeatability	50 µm or better		
1.8	Minimum wall thickness	400 µm or lower		
1.9	Laser Specification	<ul style="list-style-type: none"> • Type of Laser: High precision fiber laser. • Number of Laser Source: one 		

			<ul style="list-style-type: none"> • Laser power: 400W or higher • Laser scanning speed: minimum 7m/sec • Diameter at focus: 40-100 microns <p>Wavelength: 900-1200 nm.</p>		
1.10	Material Compatibility	<ul style="list-style-type: none"> • Machine should have options to print both reactive and non- reactive materials without any changes/ upgrades in the hardware <p>Machine should be able to handle metal powders mentioned from 3rd party metal powder manufacturers as well. SS316L, 17-4PH, 18Ni300, IN718, IN625, Ti6Al4V, Cobalt Chrome, AlSi10Mg Similar types of new materials should also be printable</p>			
1.11	Additional Features	<ul style="list-style-type: none"> • Single sided soft recoated with precise and homogenized powder coating. • For easy material change over, complete set of replacement accessories (if Any) • Integrated gas-tight working gloves through the build chamber door, to prevent oxidization of powder when the door is opened. • Integrated gas-tight working gloves through the build chamber door, to prevent oxidization of powder when the door is opened. • The machine should be able to run unattended for the entire duration of the build without operator's interference. <p>Oxygen content in the build chamber has to be continuously monitored by the computer. Electro Mechanical Safety lock for chamber to allow the door to</p>			

			<p>open only when oxygen content is in the safe limit for the operator when using the machine chamber in inert gas environment.</p>		
<p>1.12</p>		<p>Software Features</p>	<p>Build Preparation software with the following capabilities:</p> <ul style="list-style-type: none"> ○ The software must be compatible with LPBF technology for metal printing. ○ It should offer both automatic and manual modes for fixing STL files. ○ Users should be able to create basic geometries effortlessly. ○ Rescaling operations should be supported to meet user requirements. ○ The software should facilitate hollowing and perforation of objects. ○ The software must generate labels for easy identification of printed parts. ○ It should allow users to cut or punch holes in designs as needed. ○ The software must generate labels for easy identification of printed parts. ○ Users should have the ability to extrude models as required. ○ Automated part positioning should be included for easier placement during build preparation. ○ The software must include analytical tools such as wall thickness analysis, collision detection, out-of-bounds checks, and various measurement functionalities. ○ Support generation should be available in both automatic and manual modes. ○ The software should be capable of creating both non-solid supports (e.g., block, line, point) and solid supports (e.g., cone, tree). ○ An integrated build processor should be included to generate build files compatible with metal 3D printing machines. 		

			<ul style="list-style-type: none"> ○ A fully editable parameter architecture should be provided to ensure flexibility in build preparation. ○ The build processor should allow users to edit parameters like layer thickness, power, and scan speed, hatch distance, rotation angle for multiple parts in a single build. ○ Preloaded parameter sets should be available for standard alloys such as SS316L, 17-4PH, IN718, IN625, Ti6Al4V, AlSi10Mg. ○ The software should enable users to visualize vectors at different print heights before printing. <p>Support Generation Feature :</p> <ul style="list-style-type: none"> ○ Must use physics-based modelling to predict deformation areas and automatically generate support structures such as needle-thin and conical supports. ○ Support settings must be user-configurable, including: Point Distribution, Top & Bottom Connections, Gusset Preferences, Grid and Slicing Parameters ○ Must allow selection of material types like Titanium, SS 316L, Inconel 718, and Aluminium as well as adding new materials. ○ Must provide selectable calculation modes: Fast, Balanced, and Precise. ○ Must offer support intensity levels: Light, Intermediate, and Heavy. ○ Must support defining “no-support zones” to restrict supports only where required. ○ Should allow open structure supports for easy de-powdering and reduced health hazards. ○ Supports should be designed to be removed manually, minimizing post-processing costs. ○ All support geometry parameters must be fully user-editable, with 		
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			<p>option to save profiles for repeat usage.</p> <ul style="list-style-type: none"> ○ Must offer non-solid supports of various geometries. ○ Must include solid supports such as cones and tree structures for improved heat dissipation. ○ Interactive user interface to allow for manual adjustment (scaling and angling) of supports. ○ Functionality to auto-transfer support structures from a reference part to similar parts. ○ Must enable addition of lattice structures inside hollow parts or full replacement of the part with lattice geometry. ○ Must offer a built-in unit cell library with an option to add custom unit cells. ○ Must support import of custom unit cells tailored to specific application requirements. <p>Import Features:</p> <ul style="list-style-type: none"> ○ Must support import of industry-standard file formats including: IGES, CATIA5/6, JT, Inventor, NX, Parasolid, Pro/Engineer, Revit, SAT, Solid Edge, SOLIDWORKS, VDA, AMF, DAE, DXF, FBX, OBJ, OpenCTM, PLY, ZCP, SketchUp, STEP, STL, VRML, X3D, ZPR, 3DM, 3DS, PRJ, 3MF, 3D PDF. ○ Post-import conversion settings must include: ○ Control over surface accuracy, edge length, number of triangles, import of colour data, automatic fixing, etc. ○ Must allow conversion of CAD data to BREP geometry for advanced tool usage. <p>Simulation Features:</p> <ul style="list-style-type: none"> ○ A single-interface workflow must be provided for both build preparation and simulation. 		
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			<ul style="list-style-type: none"> ○ Simulation should not require advanced user expertise; must be easy to operate. ○ Must include automatic part compensation for distortion. ○ Thermal and mechanical simulation must be possible, calibrated for specific machine and material combinations. <p>Software License must be provided for <u>5 Years</u> with all updates.</p> <p>Bidder has to provide minimum 5 Licenses of software including all features.</p> <p>The software should be OEM-agnostic and widely used, supporting multiple 3D printing machines and technologies. It should have a proven track record to ensure reliable and error-free printing. Additionally, trained programmers and operators should be easily available.</p>		
1.13	Computer System	<p>Standalone Desktop Computer – 1 Unit</p> <ul style="list-style-type: none"> • Processor: Intel Core i7-14700 vPro Processor • 64 GB DDR5 RAM • 512 GB M.2 NVMe SSD • Windows 11 Professional 64 bit • Additional 2 TB SATA Hard Disk Drive • T1000 8 GB Graphics Card • 27” FHD Monitor • Dual Band USB Wi-Fi Adapter • Wireless Keyboard & Mouse 			
1.14	Power Required	440V – 50Hz (3 Phase)			
		<ul style="list-style-type: none"> ○ Wet Separator – ATEX-certified ○ Suitable Chiller unit ○ Gas filter suitable for the machine - The system should 			

1.15	Accessories	<p>possess dual filtration with HEPA filters to enhance high efficiency in filtering.</p> <ul style="list-style-type: none"> ○ Powder bottles – 5 nos. (of 2 liters each) ○ Suitable UPS for the system with minimum 15 mins backup <p>Printing Material:</p> <ol style="list-style-type: none"> 1) SS316L – 25 Kg 2) AlSi10Mg – 25 Kg 4) IN718 – 25 Kg 5) Maraging steel M300 – 25 Kg <p>Build Plate</p> <ol style="list-style-type: none"> 1) Steel 4 nos. 2) Aluminum 3 nos. <ul style="list-style-type: none"> ○ Powder storage unit ○ A suitable Shot Blasting machine of Chamber size minimum 300mm x 300mm x 300mm should be supplied with 25 Kg of Steel Shots ○ Powder Sieving Unit ○ Suitable Air Compressor compatible to run all parts of equipment 		
1.16	Safety features	<ul style="list-style-type: none"> ○ Gas Tight Door Locking Security ○ Temperature controller in process chamber ○ Safety against laser beam exposure ○ Safety against inert gas ○ Movement monitoring of build platform along vertical axis ○ Safety against material overflow in container ○ Compressed air pressure limits ○ Constant Oxygen level monitoring and control in the build chamber and interrupt the process if the O2 level crosses the permissible limit (0.2 % or lower) 		

			<ul style="list-style-type: none"> ○ Safe failure mode to enable job resumption from the same layer after power interruption. ○ D type Fire extinguisher -1 no., shall be provided 		
1.17	Quality of job produced (in the standard range of the machine)	Surface roughness of the part 10 µm or lower (For standard machine operating condition only) and 99% density for optimized conditions. Have to demonstrate the same with a coupon sample of a standard material.			
1.18	Installation, Training and Commissioning	Commissioning trials to be included within the delivery and training for 10 people for 2 weeks must be provided free of cost. Training should be arranged within 2 weeks of installation.			
1.19	Service and Support	Vendor should have expertise to complete machine maintenance in India.			
1.20	Mandatory Conditions	<ul style="list-style-type: none"> • The firm must be an OEM OR authorized dealer of the OEM manufacturing this equipment. Authorized dealer must submit the authorization certification from OEM. • The authorized dealer or the OEM to demonstrate machine servicing capability with locally available service engineers (in Mumbai) and locally stocked spare parts. • Minimum 5 installations of similar or higher configuration 3d printers should be carried out in the last five years in India. • The bidders should attach the Service Matrix Certificate with the Technical Bid. • The bidder must provide a written commitment for within 6 hours response 			

			<p>time for service calls within India and must offer a minimum of 3 years of comprehensive AMC (Annual Maintenance Contract) post warranty.</p> <ul style="list-style-type: none"> • The bidder should have supplied a minimum of two such machines to other IITs or other centrally funded premier educational institutions. <p>Installation reports and model numbers of the supplied machines must be enclosed. The bidder must also demonstrate evidence of collaboration for R&D projects or execution of customization/integration work on the quoted machine, demonstrating technical know-how and adaptability through joint conference presentation, publications, reports or certification from customers/collaborators.</p>		
2	AMC		Non-comprehensive AMC cost for 3 years after completing the two years warranty. This will not include parts changeover during this period.		
3	Warranty		Warranty of the metal 3D printer system : 2 Years warranty for 3D Printer & 1 year for all other accessories.		