



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
 Powai, Mumbai 400076.

Ref. PR No. 1000050636

RFx. No.6100002710

Item Description: Metal Powder Atomizer

Sr. No	Item Description	Detailed Technical Specification	Technical Compliance (Yes / No)	Additional Information (if any)
1.	Technology Ultrasonic Atomization to produce metal powders	<p>I. Melting Method</p> <ol style="list-style-type: none"> 1. Focused Plasma melting or TIG arc melting suitable to produce powder of steel (including stainless steel), nickel-based superalloys, Titanium-alloys and high temperature alloys (exceeding 3000°C) for the purpose of LPBF based printing. 2. Plasma system: Focused plasma with the following features-a) plasma torch must operate in internal arc mode, b) plasma torch with internal electrode must be activated with a single button without contact with the material to be processed and c) plasma power source with at least 340 A (100% duty cycle-at least 2 hours of continuous work at full power) 3. TIG melting: a) adjustable current intensity during the process (30A-200A), b) The system adapted for long term operation without overloading with appropriate cooling mechanism, c) the electrode should be placed in an automated, sealed manipulator that allow control of its position from the operator panel along three axes, d) Automated TIG torch movement for continuous and stable melting. <p>II. Powder quality:</p> <ol style="list-style-type: none"> 1. The system must produce a spherical, satellite-free powder with a shape factor greater than 0.90, as measured using dynamic image analysis. A report 		

confirming this parameter must be provided, with measurements conducted using a device compliant with ISO 9276-2:2014

2. d50 must be within a range of 40-60 μm . The system shall include a powder collection mechanism that allows collection of atomized powders from the atomization chamber without exposure to the environment or spillage.

III. Materials & Feedstock & handling

1.Ability to atomize materials with a melting point above 3000°C

Material form: materials in different forms should be acceptable for the atomization process. In particular, automated and manual feeding of materials in the shape of bars (dimension 1 mm-20 mm diameter and 300 mm length), handling of irregular shape (manual feeding) is must. Rotation of bars/irregular shape to ensure complete melting. The acceptable size of the irregular feedstock should be at least up to 20 mm diameter and 180 mm length. The wire feeding (0.8 – 2.2 mm diameter) is desirable for long and continuous operation. Automating feeding of bars and wires should be controlled through an operator panel.

2.Ability to prepare feedstock from irregular shaped pure elements and/or alloys by arc melting, with sample dimensions more than or equal to 10x10x100 mm.

3.The subsequent atomization of such prepared material must be possible without moving material out of chamber to avoid exposure and reaction with air. Required accessories for this operation must be included.

IV. Ultrasonic System

1.Ultrasonic systems operating at the range between 37 kHz and 42 kHz. The ultrasonic frequency must have a corresponding ultrasonic system kit, including an atomization adapter, dedicated transducer housing, and IP67-rated ultrasonic transducer

		<p>The active ultrasonic atomization area for processing in the plasma module must be at least 7 cm².</p> <p>2.Necessary atomization platform must be included (steel, titanium, nickel, and tungsten)</p> <p>3.Should include an appropriate frequency generator to produce metal powder suitable for LPBF process with d50 in the range of 45-60 μm</p> <p>4.Sonotrode: Starter pack of 16x TZM sonotrodes should be included</p> <p>5.Option to use end-user made custom sonotrode materials without manufacturers' markings.</p> <p>V. Atomization Platform/Chamber with accessories:</p> <p>1.The focused plasma atomization chamber must have a minimum volume of 50 dm³ to facilitate handling feedstock with complex geometry.</p> <p>2.The atomization chamber must be mounted on a mobile wheeled base with a locking mechanism for easy relocation and stability during operation</p> <p>3.The device is equipped with an appropriate vacuum pump for faster startup. It should be able to achieve vacuum level below 5×10⁽⁻²⁾ mbar. It should be equipped with vacuum sensor (Pirani) and overpressure sensor.</p> <p>4.The chamber must include at least four ISO-KF/ISO-K standard ports for installing sensors and research equipment.</p> <p>5.The plasma atomization chamber must be equipped with a mechanical gripper featuring jaws with an adjustable opening width of at least 60 mm, allowing secure material handling during arc melting, homogenization, and atomization</p> <p>6.Set of all tools needed for device maintenance and cleaning should be provided.</p> <p>7.System components to ensure easy material changeover of the device in no more than 4 hours</p> <p>Chiller to ensure the thermal stability of the atomizer - ensuring a constant temperature during the process (+/- 0.5 degree Celsius).</p>		
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1. A two-day operator training session for at least three personnel should be provided by the supplier.
2. The supplier should install, calibrate, and validate system performance at the designated location.
3. The layout, pre-installation requirements and foundation drawing of the offered machine and all the peripheral equipment should be enclosed with the Technical Offer.
4. The installation and training must be completed within 4 weeks of the receipt of the equipment.

IX. Warranty + AMC

The standard warranty period for the atomization system should be 12 months. The warranty shall start after commissioning of the equipment. The quotation must include two years of AMC following the standard warranty period of 12 months

X. Documentation:

Documentation in English to allow independent operation of the device:

- diagram of the device
 - rules of use
 - performing atomization of materials
 - replacement of basic components
- dealing with errors, failures

XI. Utilities/Infrastructure for installation:

1. Supplier shall indicate all the required utilities/infrastructure such as power, water, gas, etc. including power backup requirements.
2. Supplier shall provide overall dimensions of the Unit along with floor area/height of the site or building, including foundation details if any, for accommodating the system and sub-systems.
3. The layout, pre-installation requirements and foundation drawing of the offered machine and all the peripheral equipment should be enclosed with the

	<p>technical offer.</p> <p>4.The operating environment for the system and sub- systems including temperature and humidity control, anti-vibration, EMI, EMC etc. should be indicated.</p> <p>XII. Vendor Qualification:</p> <ol style="list-style-type: none">1. The OEM should have proven expertise of at least 3 years in manufacture and supply of the item.2. Offered system should be a proven model in the market and should not be a prototype or developmental system3. OEM should have supplied at least 05 (five) systems of similar specifications in the last 03 years worldwide and at least 02 (two) systems in India.4. An equipment utilization report is must in the form of the following:<ol style="list-style-type: none">a) At least 10 scientific publications in peer reviewed journals in last three years from independent users out of which five must be related to steel/superalloys/titanium-based alloys/refractory metalsb) Support letters from 3 customers providing feedback on the use of equipment.c)The bidder should have partners in India for local support. The maintenance support from qualified engineers should be available within India. Further support from OEM should be available over video call. Troubleshoot feature in the software is desirable to diagnose and resolve technical issues remotely. <p>XIII. Delivery:</p> <p>The equipment must be delivered within 4months of placing purchase order</p>		
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