Tender

Tender for the Supply and Installation of a Dual Laser (Green/IR) Metal 3D Printer for the University of Birmingham

THE UNIVERSITY OF BIRMINGHAM

F02: Contract notice
Notice identifier: 2023/S 000-027570
Procurement identifier (OCID): ocds-h6vhtk-0401d1
Published 19 September 2023, 9:11am

Section I: Contracting authority

I.1) Name and addresses

THE UNIVERSITY OF BIRMINGHAM

Edgbaston

BIRMINGHAM

B152TT

Contact

Emily Villers

Email

e.villers@bham.ac.uk

Country

United Kingdom

Region code

UKG31 - Birmingham

Companies House

RC000645

Internet address(es)

Main address

www.birmingham.ac.uk/index.aspx

I.3) Communication

The procurement documents are available for unrestricted and full direct access, free of charge, at

www.in-tendhost.co.uk/universityofbirmingham/aspx/Home

Additional information can be obtained from the above-mentioned address

Tenders or requests to participate must be submitted electronically via

www.in-tendhost.co.uk/universityofbirmingham/aspx/Home

I.4) Type of the contracting authority

Body governed by public law

I.5) Main activity

Education

Section II: Object

II.1) Scope of the procurement

II.1.1) Title

Tender for the Supply and Installation of a Dual Laser (Green/IR) Metal 3D Printer for the University of Birmingham

Reference number

SC11971/23

II.1.2) Main CPV code

- 42990000 - Miscellaneous special-purpose machinery

II.1.3) Type of contract

Supplies

II.1.4) Short description

The University of Birmingham invites tenders for supply of a dual laser selective laser melting (metal 3D printing) platform. The machine needs to include 2 lasers; infra-red laser and green laser sources. The machine will be a part of an investment by the University of Birmingham to facilitate/support the development of components for the UK's nuclear, space, quantum technology, biomedical, and defence sectors. In this context, the machine will be used to develop new applications for the technology in collaboration with the end-users and carry out feasibility studies and pilot projects to address the specific requirements of these sectors. Therefore, it will be required as part of the project to build strong partnerships with the technology providers and define a joint co-funded R&D programme for the benefits of the UK's economy.

The machine should be able to 3D print copper and its alloys, precious metals and alloys (e.g. silver and its alloys) using the green laser beam, achieving density >99%. It should also allow the printing of functionally graded structures that are composed of two different materials (e.g. copper to tungsten) through changing the laser source from green to infra-red simultaneously or sequentially. The machine should allow full control on the process parameters (power/heat input, laser focus parameters, scanning strategies, materials dosing, etc...). There should be very limited restrictions on the types of materials (in powder form) that can be utilised using this platform.

The system should be fully equipped with a process control interface, while being open source with respect to the process parameters. The build chamber should permit the

usage of limited quantities of powders, allowing quick optimisation runs to performed and ease of cleaning following the completion of builds.

This project may be funded by the University of Birmingham or;

- Research Councils UK (RCUK), the strategic partnership of the UK's seven Research Councils.

II.1.5) Estimated total value

Value excluding VAT: £400,000

II.1.6) Information about lots

This contract is divided into lots: No

II.2) Description

II.2.3) Place of performance

NUTS codes

- UKG31 - Birmingham

II.2.4) Description of the procurement

The University of Birmingham invites tenders for supply of a dual laser (infra red and green) selective laser melting (SLM) 3D printing machine. The machine will be a part of an investment by the University of Birmingham to facilitate/support the development of components for the UK's nuclear, space, and defence sectors. In this context, the machine will be used to develop new applications for the technology in collaboration with the end-users and carry out feasibility studies and pilot projects to address the specific requirements of these sectors. Therefore, it will be required as part of the project to build strong partnerships with the technology providers and define a joint co-funded R&D programme for the benefits of the UK's economy.

The machine should be able to 3D printing refractory, precious, functional and structural metals and alloys using focused laser beam. The machine should allow full control on the process parameters (power/heat input, laser beam parameters, scanning strategies, materials dosing, etc...). There should be very limited restrictions on the types of materials (in powder form) that can be utilised using this platform. The system should be fully equipped with a process control interface, while being fully open with respect to the process parameters. The build chamber should permit the usage of limited quantities of powders, allowing quick optimisation runs to performed and ease of cleaning following the completion of builds.

General characteristics

1. Laser beam

• Laser sources: 2x different laser sources integrated in the machine of two different wavelengths: Green (532 nm) and infrared (1060 - 1080 nm).

• Power: The system should be equipped with 2 laser sources and their associated optics; delivering at least 200 W for the green laser and 300 W for the infra-red laser (rated power), with the power input being fully controllable/adjustable by the user.

• Laser beam spot size: The infrared Laser beam spot diameter size ? 80 ?m, and the green Laser beam spot diameter size ? 50 ?m.

• Laser type: Infrared laser type should have a Continuous Wave (CW) solid state Yb + single mode fibre, while the Green laser type should have a Quasi-CW (QCW) single mode. Other laser types may be considered.

• Laser beam speed: Laser beam scanning head speed of at least 5000 mm/s is required during 3D printing operation for both lasers.

• Optical system: 3 axes scanner head for both lasers.

• Laser source flexibility: Possibility to select and operate the laser sources through the machine HMI software without changing any hardware or software settings.

2. Process chamber

• Build Volume: The system needs to have a relatively small build volume (minimum 10 cm in diameter x minimum 10 cm in height) for limited powder usage and quick material changeover. The build should be able to start with limited powder quantities (e.g. 1 cm height)

• Layer thickness: The system should permit full control on powder layer thickness, including within the same build in the range from 30?m to 100?m.

• Build platform heating: The build plate needs to be heated and maintain the processing temperature up to at least 200 °C to in-situ relieve the residual stresses in some alloys or recondition the powder from moisture, while should enabling fast and efficient heating.

• Recoater system: The recoater system should allow recoating spherical and non-spherical powders.

• Modularity and auxiliary ports: The system should be modular to allow the

replacement/upgrade of the lasers or have auxiliary ports to allow for in-situ instrumentation that can be integrated to the system software by the client.

• Atmosphere quality: The chamber should have a working atmosphere of Argon or Nitrogen, with O2 level monitoring system inside the working chamber to ? 500 ppm.

• Process monitoring: The system should have the capability to monitor the build process using a viewport.

• Build platform carrier: Resolution of the build platform carrier in the vertical z-direction (build direction) should be 30 ?m (or smaller).

3. System Software

• System software: The system should be fully open to allow the users to set the desired customisable process parameters including the scanning strategy to allowing for full process control for research purposes.

• Post process: The post processor should enable writing process parameters and for the preparation of data files (in English), readable from the machine, to produce components. The build post processor must allow free read/write access to all parameters necessary for the definition of the manufacturing process.

4. Machine specifications:

• Power: Industrial power supply (32A, 380V) with a maximum absorption of 6 kW.

• Chiller: The machine should have its own chiller unit to cool down optics and both laser sources.

• Warranty: 12 months including the lasers.

• Maximum external dimensions (L x W x H): 2500 mm x 1500 mm x 2500 mm.

• The machine must be new. Used, refurbished, ex-demo machines are not permitted.

• The machine should be available commercially, with at least 2 installations completed at customer site before the participation to the tender process.

5. Installation:

The offer should include:

• Commissioning and installation.

• A starting kit including machine testing, start-up powder and personal protective equipment. The installation instruction and operative manual should be provided in English, in paper and/or digital format.

• Basic training for up to 4 operators who will be assigned to the use and programming of the machine.

II.2.5) Award criteria

Quality criterion - Name: Compliance to the Specifications / Weighting: 40

Quality criterion - Name: After Sales and Technical back up / Weighting: 10

Quality criterion - Name: Delivery and Training / Weighting: 10

Quality criterion - Name: Sustainability and Environmental / Weighting: 5

Quality criterion - Name: Standard Supplier Questionnaire (SQ) / Weighting: 10

Price - Weighting: 25

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 October 2023

End date

30 April 2024

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: No

II.2.11) Information about options

Options: No

Section IV. Procedure

IV.1) Description

IV.1.1) Type of procedure

Open procedure

IV.1.8) Information about the Government Procurement Agreement (GPA)

The procurement is covered by the Government Procurement Agreement: Yes

IV.2) Administrative information

IV.2.2) Time limit for receipt of tenders or requests to participate

Date

17 October 2023

Local time

11:59am

IV.2.4) Languages in which tenders or requests to participate may be submitted

English

IV.2.7) Conditions for opening of tenders

Date

17 October 2023

Local time

12:00pm

Section VI. Complementary information

VI.1) Information about recurrence

This is a recurrent procurement: No

VI.4) Procedures for review

VI.4.1) Review body

The University of Birmingham

Birmingham

B15 2TT

Country

United Kingdom