



RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Travaux publics et Services gouvernementaux
Canada
Voir dans le document/
See herein
NA
Québec
NA

REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION

Proposal To: Public Works and Government Services Canada

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

Proposition aux: Travaux Publics et Services Gouvernementaux Canada

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments - Commentaires

| | |
|---|--|
| Title - Sujet Laser metal sys powder bed fusion | |
| Solicitation No. - N° de l'invitation 31206-203806/B | Date 2020-04-30 |
| Client Reference No. - N° de référence du client 31206-203806 | |
| GETS Reference No. - N° de référence de SEAG PW-\$MTA-030-15723 | |
| File No. - N° de dossier MTA-9-42210 (030) | CCC No./N° CCC - FMS No./N° VME |
| Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2020-05-29 | Time Zone Fuseau horaire Heure Avancée de l'Est HAE |
| F.O.B. - F.A.B. Specified Herein - Précisé dans les présentes Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input checked="" type="checkbox"/> | |
| Address Enquiries to: - Adresser toutes questions à: Pommet, Bruno André | Buyer Id - Id de l'acheteur mta030 |
| Telephone No. - N° de téléphone (514) 702-9582 () | FAX No. - N° de FAX (514) 496-3822 |
| Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: NRC- Winnipeg Site 435 Ellice Avenue Winnipeg, Manitoba R3B 1Y6 | |

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address

Raison sociale et adresse du fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution

Travaux publics et Services gouvernementaux Canada
Place Bonaventure, portail Sud-Oue
800, rue de La Gauchetière Ouest
7e étage, suite 7300
Montréal
Québec
H5A 1L6

| | |
|--|--|
| Delivery Required - Livraison exigée Voir doc. | Delivery Offered - Livraison proposée |
| Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur | |
| Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur | |
| Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie) | |
| Signature | Date |

This bid solicitation cancels and supersedes previous bid solicitation number 31206-203806 /A dated 2020/02/10 with a closing of 2020/03/23 at 14:00 (EDT). A debriefing or feedback session will be provided upon request to bidders/offerors/suppliers who bid on the previous solicitation.

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PART 1 - GENERAL INFORMATION

1.1 Security Requirements

There is no security requirement applicable to this document.

1.2 Requirement

The requirement is detailed under Annex "A".

1.3 Debriefings

Bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority ***within 15 working days*** from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

1.4 Epost Connect service

This bid solicitation allows bidders to use the epost Connect service provided by Canada Post Corporation to transmit their bid electronically. Bidders must refer to Part 2 entitled Bidder Instructions, and Part 3 entitled Bid Preparation Instructions, of the bid solicitation, for further information.

PART 2 - BIDDER INSTRUCTIONS

2.1 Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The [2003](#) ((2019-03-04) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

Subsection 5.4 of [2003](#), Standard Instructions - Goods or Services - Competitive Requirements, is amended as follows:

Delete: 60 days
Insert: 120 days

2.1.1 SACC Manual Clauses

[A9033T](#) (2012-07-16), Financial Capability
[B1000T](#) (2014-06-26), Condition of Material – Bid

2.1.2 Best Delivery Date – Bid *(to be filled by the bidder)*

While delivery is requested as soon as possible, the best delivery that could be offered is _____.

2.2 Submission of Bids

Bids must be submitted only to the Public Works and Government Services Canada (PWGSC) Bid Receiving Unit specified below by the date and time indicated on page 1 of the bid solicitation:

PWGSC Québec Region Bid Receiving Unit

Only bids submitted using epost Connect service will be accepted. The Bidder must send an email requesting to open an epost Connect conversation to the following address:

TPSGC.RQReceptionSoumissions-QRSupplyTendersReception.PWGSC@tpsgc-pwgsc.gc.ca

Note: Bids will not be accepted if emailed directly to this email address. This email address is to be used to open an epost Connect conversation, as detailed in Standard Instructions 2003, or to send bids through an epost Connect message if the bidder is using its own licensing agreement for epost Connect.

It is the Bidder's responsibility to ensure the request for opening an epost Connect conversation is sent to the email address above at least six days before the solicitation closing date.

Bids transmitted by facsimile or hardcopy to PWGSC will not be accepted.

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2.3 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority **no later than seven (7) calendar days** before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by Bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all Bidders. Enquiries not submitted in a form that can be distributed to all Bidders may not be answered by Canada.

2.4 Applicable Laws

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Québec.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the Bidders.

PART 3 - BID PREPARATION INSTRUCTIONS

3.1 Bid Preparation Instructions

The Bidder must submit its bid electronically in accordance with section 08 of the 2003 standard instructions. The epost Connect system has a limit of 1GB per single message posted and a limit of 20GB per conversation.

The bid must be gathered per section and separated as follows:

Section I: Technical Bid
Section II: Financial Bid
Section III: Certifications

Bids transmitted by facsimile or hardcopy will not be accepted.

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Section I: Technical Bid

In their technical bid, Bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

Section II: Financial Bid

Bidders must submit their financial bid in accordance with the Basis of Payment.

3.1.1 Electronic Payment of Invoices – Bid

If you are willing to accept payment of invoices by Electronic Payment Instruments, complete Annex "D" Electronic Payment Instruments, to identify which ones are accepted.

If Annex "D" Electronic Payment Instruments is not completed, it will be considered as if Electronic Payment Instruments are not being accepted for payment of invoices.

Acceptance of Electronic Payment Instruments will not be considered as an evaluation criterion.

Section III: Certifications

Bidders must submit the certifications and additional information required under Part 5.

PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

4.1 Evaluation Procedures

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

4.1.1 Technical Evaluation

The technical evaluation will be based on the technical mandatory criteria to be demonstrated detailed in Annex C. Every proposal must meet the technical mandatory criteria described in Annex C in order to be technically compliant.

It is mandatory to provide, with your bid, all technical / descriptive documents / notes that allow the technical evaluation. Failure to comply will render your bid non-responsive.

Bidders should complete the grid in Annex C and include it with their proposal.

4.1.2 Financial Evaluation

Financial evaluation total = Sum of price of **items 1 to 10** indicated in Annex "B".

4.1.2.1 Evaluation of Price - Canadian/Foreign Bidder

1. Bidders must submit firm prices, Customs duties, Excise taxes and Applicable Taxes excluded.
2. Unless the bid solicitation specifically requires bids to be submitted in Canadian currency, bids submitted in foreign currency will be converted to Canadian currency for evaluation purposes. The rate given by the Bank of Canada in effect on the bid solicitation closing date, or on another date specified in the bid solicitation, will be applied as a conversion factor to the bids submitted in foreign currency.
3. Bidders must provide prices Delivered at Place (DAP) **Winnipeg**, MB, Canada Incoterms 2010 for shipments from a commercial contractor. Bids will be assessed on a DAP basis.

4.2 Basis of Selection

4.2.1 SACC Manual Clause

[A0031T](#) (2010-08-16), Basis of Selection - Mandatory Technical Criteria

PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION

Bidders must provide the required certifications and additional information to be awarded a contract.

The certifications provided by Bidders to Canada are subject to verification by Canada at all times. Unless specified otherwise, Canada will declare a bid non-responsive, or will declare a contractor in default if any certification made by the Bidder is found to be untrue whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority will render the bid non-responsive or constitute a default under the Contract.

5.1 Certifications Required with the Bid

Bidders must submit the following duly completed certifications as part of their bid.

5.1.1 Integrity Provisions - Declaration of Convicted Offences

In accordance with the Integrity Provisions of the Standard Instructions, all bidders must provide with their bid, **if applicable**, the declaration form available on the [Forms for the Integrity Regime](http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html) website (<http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html>), to be given further consideration in the procurement process.

5.2 Certifications Precedent to Contract Award and Additional Information

The certifications and additional information listed below should be submitted with the bid, but may be submitted afterwards. If any of these required certifications or additional information is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to provide the certifications or the additional information listed below within the time frame provided will render the bid non-responsive.

5.2.1 Integrity Provisions – Required Documentation (*see Annex E*)

In accordance with the section titled Information to be provided when bidding, contracting or entering into a real property agreement of the [Ineligibility and Suspension Policy](http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Bidder must provide the required documentation, as applicable, to be given further consideration in the procurement process.

5.2.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list available at the bottom of the page of the [Employment and Social Development Canada \(ESDC\) - Labour's](https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#) website (<https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#>).

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list at the time of contract award. Canada will also have the right to terminate the Contract for default if a Contractor, or any member of the Contractor if the Contractor is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list during the period of the Contract.

The Bidder must provide the Contracting Authority with a completed annex titled Federal Contractors Program for Employment Equity - Certification, before contract award. If the Bidder is a Joint Venture, the

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MTA030
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Bidder must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification, for each member of the Joint Venture.

5.2.3 Additional Certifications Precedent to Contract Award

5.2.3.1 Certification

Original equipment manufacturer

Any bidder that is not the original equipment manufacturer (OEM) for every item proposed as part of its bid is required to submit a certificate signed by the OEM (not the bidder) certifying the bidder's authority to provide and maintain the OEM's items. No contracts will be awarded to a bidder that is not the original equipment manufacturer of the items proposed to Canada unless the manufacturer certification has been provided to Canada.

PART 6 - RESULTING CONTRACT CLAUSES

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

6.1 Security Requirements

6.1.1 There is no security requirement applicable to the Contract.

6.2 Requirement

The Contractor must provide the items detailed under the "Requirement" at Annex "A".

6.3 Standard Clauses and Conditions

All clauses and conditions identified in the Contract by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) (https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) issued by Public Works and Government Services Canada.

6.3.1 General Conditions

[2030](#) (2018-06-21), General Conditions - Higher Complexity - Goods apply to and form part of the Contract.

6.3.1.1 Warranty Period:

Section 22 of general conditions [2030](#) is amended by replacing the period of 12 months by 24 months. All other provisions of the warranty section remain in effect.

6.4 Term of Contract

6.4.1 Period of the Contract

The period of the Contract is from the date of Contract award until May 31, 2022 (inclusive).

6.4.2 Delivery Date

The system, its components and accessories (**items # 1-2-3** of Annex B – Basis of payment) must be received on or before _____ **(to be filled at contract award)**.

Installation, commissioning as well as training (**items # 8-9** of Annex B – Basis of payment) must be completed within 30 business days following PWGSC's notice during the following period: **between January 1, 2021 and January 31, 2022.**

6.4.3 Delivery Points

Delivery of the requirement will be made to delivery point specified at Annex "A" of the Contract.

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6.5 Authorities

6.5.1 Contracting Authority

Name: **Bruno André Pommet**

Title: Supply specialist

Public Works and Government Services Canada

Acquisitions Branch Directorate Supply

Address: 800 de la Gauchetière Ouest, suite 7300, Montréal (Québec), Canada, H5A 1L6

Telephone: 514-702-9582

Facsimile: 514-496-3822

E-mail address: brunoandre.pommet@tpsgc.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

6.5.2 Project Authority *(to be filled at contract award)*

The Project Authority for the Contract is:

Name: _____

Title: _____

Organization: _____

Address: _____

Telephone: _____

Facsimile: _____

E-mail address: _____

The Project Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Project Authority, however the Project Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

6.5.3 Contractor's Representative *(to be filled by the bidder)*

Name: _____

Title: _____

Organization: _____

Address: _____

Telephone: _____

Facsimile: _____

E-mail address: _____

6.6 Payment

6.6.1 Basis of Payment

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid firm unit prices, as specified in Annex B for a cost of \$ _____. *(amount will be inserted at contract award)*. Customs duties are excluded and Applicable Taxes are extra.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

6.6.2 Multiple Payments

SACC Manual clause [H1001C](#) (2008-05-12) Multiple payments

6.6.3 SACC Manual Clauses

SACC Manual clause [C2000C](#) (2007-11-30), Taxes - Foreign-based Contractor

6.6.4 Electronic Payment of Invoices – Contract *(As per bidder's choice-s in Annex D)*

The Contractor accepts to be paid using any of the following Electronic Payment Instrument(s):

- a. Visa Acquisition Card;
- b. MasterCard Acquisition Card;
- c. Direct Deposit (Domestic and International);
- d. Electronic Data Interchange (EDI).

6.6.5 Invoicing Instructions

1. The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice has been completed.
2. Invoices must be distributed as follows:
 - a. The original and one (1) copy must be forwarded to the following e-mail address for certification and payment:

NRC.Invoice-Facture.CNRC@nrc-cnrc.gc.ca
 - b. One (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

6.7 Certifications and Additional Information

6.7.1 Compliance

Unless specified otherwise, the continuous compliance with the certifications provided by the Contractor in its bid or precedent to contract award, and the ongoing cooperation in providing additional information are conditions of the Contract and failure to comply will constitute the Contractor in default. Certifications are subject to verification by Canada during the entire period of the Contract.

6.7.2 Federal Contractors Program for Employment Equity - Default by the Contractor

The Contractor understands and agrees that, when an Agreement to Implement Employment Equity (AIEE) exists between the Contractor and Employment and Social Development Canada (ESDC)-Labour, the AIEE must remain valid during the entire period of the Contract. If the AIEE becomes invalid, the name of the Contractor will be added to the "[FCP Limited Eligibility to Bid](#)" list. The imposition of such a sanction by ESDC will constitute the Contractor in default as per the terms of the Contract.

6.8 Applicable Laws *(to be filled by the bidder)*

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in _____ *(insert the name of a province or territory of CANADA).*

6.9 Priority of Documents

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) the general conditions 2030 (2018-06-21), General Conditions - Higher Complexity - Goods
- (c) Annex A, Requirement;
- (d) Annex B, Basis of payment;
- (e) the Contractor's bid dated _____ *(insert date of bid) (If the bid was clarified or amended, insert at the time of contract award: " as clarified on _____ " or " as amended on _____ " and insert date(s) of clarification(s) or amendment(s)).*

6.10 Limitation of Contractor's Liability for Damages to Canada

1. This section applies despite any other provision of the Contract and replaces the section of the general conditions entitled "Liability". Any reference in this section to damages caused by the Contractor also includes damages caused by its employees, as well as its subcontractors, agents, and representatives, and any of their employees.

2. Whether the claim is based in contract, tort, or another cause of action, the Contractor's liability for all damages suffered by Canada caused by the Contractor's performance of or failure to perform the Contract is limited to the **contract value**. This limitation of the Contractor's liability does not apply to:

- a. any infringement of intellectual property rights; or
- b. any breach of warranty obligations.

3. Each Party agrees that it is fully liable for any damages that it causes to any third party in connection with the Contract, regardless of whether the third party makes its claim against Canada or the Contractor. If Canada is required, as a result of joint and several liability, to pay a third party in respect of damages caused by the Contractor, the Contractor must reimburse Canada for that amount.

6.11 SACC Manual Clauses

- A2000C (2006-06-16), Foreign Nationals (Canadian Contractor)
- A2001C (2006-06-16), Foreign Nationals (Foreign Contractor)
- A9068C (2010-01-11), Government Site Regulations
- B1501C (2018-06-21), Electrical equipment
- D0018C (2007-11-30), Delivery and Unloading
- G1005C (2016-01-28), Insurance - No Specific Requirement

ANNEX "A"

REQUIREMENT

1.0 Object

The National Research Council of Canada (NRC), Winnipeg site, is seeking to acquire a **Laser metal powder bed fusion additive manufacturing system**. NRC wants to diversify its additive manufacturing activities to meet the needs of Canadian industry in the development and implementation of this process.

The scope of work includes the supply, transportation, delivery, installation and commissioning of the system and all accessories as well as training in the use of the equipment.

2.0 Technical Mandatory Specifications

2.1 The Laser metal powder bed fusion additive manufacturing system must include all the elements necessary to produce high quality samples and / or metal parts by laser powder bed melting, in a safe framework, based on 3D digital model, by fusing locally and selectively the bed of metal powder layer by layer, using a laser.

2.2 The system and its accessories must be able to perform the following tasks:

- 2.2.1 Powder transfer from the storage containers to the reservoir of the additive manufacturing system;
- 2.2.2 Preparation of laser trajectories and parameters from the 3D model of the part or sample;
- 2.2.3 Manufacture of parts and / or coupons;
- 2.2.4 Cleaning the parts by removing all unfused powder;
- 2.2.5 Transfer of unused powder to storage containers;
- 2.2.6 Cleaning the machine by vacuuming the powder.

2.3 The CNC must have the ability of bi-directional communication on internal memory tags, process variables and sensor data with a SCADA via an OPC UA, MQTT or other websocket protocol.

Note: Two-way communication does not involve changing the process parameters in real time. The NRC asks to be able to communicate with the equipment in order to be able to start it, stop it, and obtain information on the parameters measured by the equipment when the process is in progress. For example, the status of the equipment (emergency stop, alarm message, etc.) must be accessible under a request by the SCADA. Real-time access to process parameters must be accessible by request.

2.4 The system as a whole must be able to function and manufacture parts in the following materials:

- TiAl6V4;
- Inconel 625;
- AlSi10Mg and/or AlSi12 and/or AlSi7Mg;
- Maranging steel, at least 4 cubic demonstration coupons (1 cc) to be provided **at the bid's submission or before contract award upon Canada's request**. The coupons will be used to analyze the microstructure.

2.5 The system must have at least one laser source:

- 2.5.1 Wavelength between 1020 and 1120 nm;
- 2.5.2 Capable of delivering a maximum power of at least 500W
- 2.5.3 Capable of achieving a maximum movement speed of at least 2m / s;
- 2.5.4 Having a beam whose diameter can be adjusted between 100 and 500µm.

2.6 The system must have a bed of powder:

- 2.6.1 The production platform must have at least a dimension greater than or equal to 300 mm and an area of not less than 700 cm².
 - 2.6.1.1 The height of the manufacturing enclosure must be at least 300mm, for an operational volume of at least 21,000cc;
- 2.6.2 Which must preheat to a maximum temperature of at least 500 ° C, it is mandatory all over the entire surface of the production platform for an operational volume of at least 21,000cc;
- 2.6.3 Which must be able to be put under pressure with a nitrogen or argon atmosphere. Both gases must be usable. The maximum oxygen level in the manufacturing chamber must be less than 100ppm;
- 2.6.4 Must have a powder dispensing and spreading system to obtain a uniform powder layer of controllable thickness between 20 and 150 µm, and recover excess unused powder.

2.7 The entire system must allow safe management of metal powders:

- 2.7.1 The system must operate safely with standard powders developed for metal additive manufacturing by laser powder bed melting, with a particle size distribution between 15 and 50µm.
- 2.7.2 The system must be able to accept powders from all powder suppliers, as long as the powders meet the specifications defined by the system supplier.
- 2.7.3 In order to maximize the use of the additive manufacturing equipment, the cleaning of the parts manufactured to extract the non-fused powder must be done in another enclosure than the additive manufacturing enclosure.

2.8 Process control:

- 2.8.1 The control system must be equipped with an optical camera that makes it possible to take high-resolution images in the visible range of the powder bed after each step of spreading the powder.
- 2.8.2 The system must record the following data for the duration of the manufacturing process: laser position, laser power rating, scan rate, oxygen concentration, powder bed temperature.
- 2.8.3 All data (including images taken by the camera) must be exportable to a computer.

2.9 The Laser metal powder bed fusion additive manufacturing system must include all the elements necessary to produce high quality samples and / or metal parts by laser powder bed melting in a secure, modeled environment. 3D digital, by locally and selectively fusing the bed of metal powder layer by layer, using a laser.

2.10 All operations must be safe and ergonomic:

- 2.10.1 By limiting operator exposure to powder particles by the use of resealable and sealed containers during transport and glove boxes when the powders must be handled and vacuumed;
- 2.10.2 Minimizing the risk of explosion by grounding each piece of equipment;
- 2.10.3 By providing mechanical assistance, such as a transport cart, for handling heavy parts and components (≥ 20 pounds).

2.11 The system must be delivered with all the necessary software for the preparation and execution of the manufacturing, including the following functionalities:

- 2.11.1 3D model loading;
- 2.11.2 Positioning the piece (s) and samples on the tray;
- 2.11.3 Slicing and hatching of 3d models;
- 2.11.4 Generation of trajectories and machine code for manufacturing;
- 2.11.5 Transfer to the controller of the additive manufacturing system.

2.12 The entire system must allow safe management of metal powders:

- 2.12.1 The powder must be able to be maintained under a controlled atmosphere (the internal build chamber atmosphere must be inert) throughout its use, from the transfer of the powder containers to the equipment tanks, the transfer of the tanks into the machine, the manufacture of the samples, the cleaning of the samples, recovering the unused powder, sieving the unused powder, transferring it to the original containers. The building chamber must be filled with inert gas (Nitrogen or Argon) with an O₂ content below the limit mentioned in the specifications.
- 2.12.2 The powder used must be sieved to exclude sintered particles that have a size greater than 50 μm .
- 2.12.3 The system must be delivered with accessories for safe cleaning of additive manufacturing equipment. This may include explosion-proof powder suction equipment. The device must be provided at delivery even if it is from a third party.
- 2.12.4 To facilitate the change of materials during research activities, the system must be delivered with at least two (2) sets of accessories including, at least for each set: three (3) powder reservoirs, one (1) sieve, filters and tubing required for equipment to operate without contamination.
- 2.12.5 The system must be equipped with filters to recover ultrafine powders (submicron) and vaporized elements during manufacture.
- 2.12.6 The containers of powders that can be heavy, the transport and the loading of these items in the additive manufacturing system must be done by means of a conveyor

2.13 The software suite provided with the system must offer the following features:

- 2.13.1 Must be able to load 3D models, accepting at least .step or .stl formats
- 2.13.2 Must allow positioning and orientation of parts on the nesting board

- 2.13.3 Must allow to slice the 3D model (slicing)
- 2.13.4 Must be able to generate the laser paths for the melting of the powder of each layer, offering different options of hatching:
 - 2.13.4.1 The scanning options, diagonal, vertical, horizontal should allow us to scan along different axes in a hatching area;
 - 2.13.4.2 The hatching zone must allow to divide its surface into multiple zones in order to reduce the residual stresses induced by the process.
- 2.13.5 Must allow to define the manufacturing parameters;
- 2.13.6 Must generate the machine code for the entire production sequence;
- 2.13.7 Must be able to transfer machine code to additive manufacturing equipment.

2.14 Communication:

- 2.14.1 The control software must be able to slice the 3D models of the parts, position them and specify the process parameters associated with each slice or group of slices. Slices and group of slices can be interpreted as layers and group of layers. The request is for the software to be able to modify or adjust parameters for specific layers or group of layers during the build of parts and/or specimens.
- 2.14.2 The control system must allow the adjustment of the manufacturing parameters
- 2.14.3 The manufacturing parameters must be in a database accessible in read and write mode.
- 2.14.4 The user must be able to create, save and modify the manufacturing parameters
- 2.14.5 The system must have a USB communication port and an Ethernet communication port
- 2.14.6 The system software must allow direct access to a controller that functions similarly to a SCADA port.
- 2.14.7 The CNC must allow access to add additional tags or process parameters to the SCADA bus.
- 2.14.8 The CNC must be able to interact with other external controllers (SCADA Type) as required via a time-enabled and network-enabled Ethernet interface for control signals
- 2.14.9 The CNC must have the ability to bi-directional communication on internal memory tags, process variables and sensor data with a SCADA via an OPC UA, MQTT or any other websocket protocol.

3.0 Deliverables

3.1 The supplier must include the following specifications **in their proposal or before contract award upon Canada's request:**

- 3.1.1 Power supply: the supplier must specify the power consumption of each deliverable (Volts, kVa phases). The equipment must operate on 60Hz. These information must also be included in the manuals (documentation) provided upon system delivery.

3.1.2 Services: the supplier must provide information on the required services (gas, water, etc.) for the proper operation of the deliverables. It must provide the pressures, flow rates and pipe diameters required to supply the deliverables. Connector types must also be provided. These information must be included in the manuals (documentation) provided upon system delivery.

3.1.3 Foundations: the supplier must specify the floor and foundation required to support the deliverables (type of concrete, thickness, concrete slab insulated from vibration, etc.)

3.1.4 Ventilation: the supplier must specify the required ventilation to safely use the deliverables. It must specify flow rates, pressures and pipe diameters. The supplier can quote not applicable if the system and its station do not require such a dust extracting system. The supplier can also provide the filtering capabilities and capacities of the embedded filtering system.

3.2 All the following documentation must be provided in English in paper and electronic format **upon delivery**. A French version must be provided if available in paper and electronic format.

3.2.1 User's manual including safety precautions;

3.2.2 Service and maintenance manuals, which should include: Component lists for troubleshooting.

3.2.3 Programming manual must contain:

3.2.3.1 the list of programming codes;

3.2.3.2 a definition for each code;

3.2.3.3 an example showing how the code should be activated and deactivated.

3.2.4 A maintenance manual: it must demonstrate by diagrams, drawings or photographs and written explanations the procedures to follow to maintain the equipment.

3.2.4.1 The maintenance manual must cover the mechanical and electrical aspects.

3.2.4.2 It must contain the electrical and mechanical diagrams, drawings and diagrams of the parts making up the system.

3.2.4.3 It must give the frequencies of the checks, the person responsible (machinist, mechanic, electrician, plumber) in a table.

3.2.5 The programming diagrams of the PLC must also be provided.

3.2.6 Proof of CSA, NFPA including CSA 60825 certification, compliance with Canadian CSA electrical standards. Proof can be found in one of the manuals provided.

3.2.7 The list of chemicals used, e.g. grease, oils, refrigerant, etc. and their respective MSDS must be provided upon delivery.

3.2.8 The list of consumables and replacement parts must be provided. The list must contain the part numbers.

3.2.9 The diagrams (mechanical, pneumatic, hydraulic and electrical) provided must refer to the part number.

3.3 The supplier must also provide upon delivery at least two (2) sets of accessories including, as a minimum for each set upon delivery:

- 3.3.1 Three (3) powder tanks;
- 3.3.2 One (1) sieve;
- 3.3.3 Filters and tubing required for equipment to operate without contamination.

3.4 After the contract has been awarded and before installation and commissioning, the supplier must provide:

3.4.1 Proof of progress

Proof of progress must be provided following contract award according to the process supplier assembly. This proof is prior to the FAT.

At least 3 proofs of progress may be required, for example:

- 1- The completed assembly of the system as well as the results of the quality tests;
- 2- System calibration;
- 3- The final integration of the electronic components into the system.

Note that the nature of the proof will be subject to discussion with the supplier and is not limited to the above examples. Details are to come following the contract award.

These proof must be supported by a document demonstrating the progress of the project (videos, photos and / or internet link) as well as a detailed written test report, sent by email, to NRC project manager. Each written report should be 2 to 3 pages maximum.

3.4.2 Factory Acceptance Test (FAT)

A factory acceptance test (FAT) must take place prior to the delivery of the equipment.

The NRC must physically assist to the final quality control of the equipment as well as its start-up.

For the FAT, the NRC requests the production of a witness piece according to the standard from the supplier. The supplier will be responsible for supplying, at its expense, the metal powder required during FAT.

During the FAT, the NRC will also assess the conformity of the equipment technical specifications. The duration of the conformity assessment and the FAT will be one (1) day.

In addition, the supplier must notify the NRC at least 30 days prior to the scheduled test date of the Factory Acceptance Test (FAT).

4.0 Delivery – Installation – Commissioning

4.1 The system must be directly delivered at the following address following the FAT (where the equipment will be stored):

NRC – Winnipeg Site
435 Ellice Avenue

Winnipeg, Manitoba, R3B 1Y6

Note: The NRC will be responsible of the transportation, unloading and moving of the equipment between the storage building and the new NRC premise.

4.2 The supplier must install and commission the equipment **later on** at the NRC-Winnipeg-Fabrication Additive site (**address to be determined, the site is under construction**).

4.2.1 Installation must take place **between January 1, 2021 and January 31, 2022** and within a maximum of thirty (30) working days after confirmation by the new NRC-Winnipeg-Fabrication Additive site.

5.0 Training

A minimum of five (5) day complete training in English must be provided, according to the supplier's training plan, day by day, to a minimum of four (4) users **following the installation and commissioning**. Training must, as a minimum, cover the following elements:

- Operation;
- Programming, program execution, data transfer and communication;
- Routine calibration and maintenance;
- For each deliverable having a controller, the supplier must provide training covering at least and not limited to the following points:
 - Numerical control;
 - Functions for importing programs, 3D models;
 - Programming of a part to be manufactured;
 - Programming of manufacturing parameters;
 - Creation, adjustment, modification and saving of parameters;
 - Adjustment of offsets / slicing / hatching;
 - Creation, saving and loading of manufacturing programs;
 - Manufacturing parameters, creation, saving, calling of parameters in an NC program;
 - Editing of the program;
 - File and error message;
 - Manufacturing data files.
- Mechanical maintenance, replacement of consumables;
- Troubleshooting from error messages and alarms.

The training must take place **between January 1, 2021 and January 31, 2022** and in a maximum of thirty (30) working days after confirmation by the new NRC-Winnipeg-Fabrication Additive site.

6.0 Technical assistance service

The supplier must provide technical assistance starting **upon equipment commissioning (start-up) and for the duration of the contract**, in English, by telephone and / or email during NRC business hours - Winnipeg-Manufacturing Additive (Monday to Friday between 9:00 a.m. and 3:00 p.m., CST).

The supplier must return calls or respond to emails within 48 to 72 hours.

ANNEX "B" - BASIS OF PAYMENT

| Item | Item description | Quantity | Price * |
|------|--|----------|----------|
| 1 | Metal additive manufacturing System by Laser powder bed fusion, its components and accessories, as described at Annex A – section 2. | 1 | \$ _____ |
| 2 | All the manuals listed and indicated at Annex A - section 3.2. | Lot | \$ _____ |
| 3 | Two (2) sets of accessories including, as a minimum for each set upon delivery: <ul style="list-style-type: none"> • Three (3) powder tanks; • One (1) sieve; • Filters and tubing required for equipment to operate without contamination. (as described at Annex A – section 3.3) | Lot | \$ _____ |
| 4 | Proof of progress, as described at Annex A – section 3.4.1. | Lot | \$ _____ |
| 5 | Factory Acceptance Test (FAT), as described at Annex A – section 3.4.2. | 1 | \$ _____ |
| 6 | All packaging, transport and delivery costs. | 1 | \$ _____ |
| 7 | 24 month warranty period on the Metal additive manufacturing System and all components and accessories. | 1 | \$ _____ |
| 8 | Installation and commissioning (start-up) (<i>date and address to be confirmed by NRC</i>), all travel expenses included. (as described at Annex A – section 4) | 1 | \$ _____ |

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File No. - N° du dossier
MTA-9-42210

Buyer ID - Id de l'acheteur
MTA030
CCC No./N° CCC - FMS No./N° VME

| | | | |
|--------------|--|---|-----------|
| 9 | On-site training lasting at least 5 days (<i>dates and address to be confirmed by NRC</i>), all travel expenses included. (as described at Annex A – section 5) | 1 | \$ _____ |
| 10 | Technical assistance service for the duration of the contract, as described at Annex A – section 6. | 1 | \$ _____ |
| TOTAL | | | \$ _____* |

*Currency (if other than CAD\$): _____

*Applicable taxes extra.

ANNEX "C"

MANDATORY TECHNICAL CRITERIA TO BE DEMONSTRATED

| No. | MANDATORY TECHNICAL CRITERIA (reference to Annexe A) | Reference: Please specify where these technical criteria are demonstrated within your technical bid and/or technical notes/documents. |
|-----|--|--|
| 2.2 | <p>The system and its accessories must be able to perform the following tasks:</p> <p>2.2.1 Powder transfer from the storage containers to the tanks of the additive manufacturing system;</p> <p>2.2.2 Preparation of laser trajectories and parameters from the 3D model of the part or sample;</p> <p>2.2.3 Manufacture of parts and / or coupons;</p> <p>2.2.4 Cleaning the parts by removing all unfused powder;</p> <p>2.2.5 Transfer of unused powder to storage containers;</p> <p>2.2.6 Cleaning the machine by vacuuming the powder.</p> | |
| 2.4 | <p>The system as a whole must be able to function and manufacture parts in the following materials:</p> <ul style="list-style-type: none"> • TiAl6V4; • Inconel 625; • AlSi10Mg and/or AlSi12 and/or AlSi7Mg; | |
| 2.5 | <p>The system must have at least one laser source:</p> <p>2.5.1 Wavelength between 1020 and 1120 nm;</p> <p>2.5.2 Capable of delivering a maximum power of at least 500W</p> <p>2.5.3 Capable of achieving a maximum movement speed of at least 2m / s;</p> <p>2.5.4 Having a beam whose diameter can be adjusted between 100 and 500µm.</p> | |

| | | |
|------------|---|--|
| <p>2.6</p> | <p>The system must have a bed of powder:</p> <p>2.6.1 The production platform of which must have at least a dimension greater than or equal to 300 mm and an area of not less than 700 cm².</p> <p>2.6.1.1 The height of the manufacturing enclosure must be at least 300mm, for an operational volume of at least 21,000cc;</p> <p>2.6.2 Which must preheat to a maximum temperature of at least 500 ° C, it is mandatory all over the entire surface of the production platform for an operational volume of at least 21,000cc;</p> <p>2.6.4 Which must be able to be put under pressure with a nitrogen or argon atmosphere. Both gases must be usable. The maximum oxygen level in the manufacturing chamber must be less than 100ppm;</p> <p>2.6.4 Must have a powder dispensing and spreading system to obtain a uniform powder layer of controllable thickness between 20 and 150 µm, and recover excess unused powder.</p> | |
| <p>2.7</p> | <p>The entire system must allow safe management of metal powders:</p> <p>2.7.1 The system must operate safely with standard powders developed for metal additive manufacturing by laser powder bed melting, with a particle size distribution between 15 and 50µm.</p> <p>2.7.2 The system must be able to accept powders from all powder suppliers, as long as the powders meet the specifications defined by the system supplier.</p> <p>2.7.3 In order to maximize the use of the additive manufacturing equipment, the cleaning of the parts manufactured to extract the non-fused powder must be done in another enclosure than the additive manufacturing enclosure.</p> | |
| <p>2.8</p> | <p>Process control:</p> <p>2.8.1 The control system must be equipped with an optical camera that makes it possible to take high-resolution images in the visible range of the powder bed after each step of spreading the powder.</p> <p>2.8.2 The system must record the following data for the duration of the manufacturing process: laser position, laser power rating,</p> | |

| | | |
|-------------|--|--|
| | <p>scan rate, oxygen concentration, powder bed temperature.</p> <p>2.8.3 All data (including images taken by the camera) must be exportable to a computer.</p> | |
| <p>2.11</p> | <p>The system must be delivered with all the necessary software for the preparation and execution of the manufacturing, including the following functionalities:</p> <p>2.11.1 3D model loading;</p> <p>2.11.2 Positioning the piece (s) and samples on the tray;</p> <p>2.11.3 Slicing and hatching of 3d models;</p> <p>2.11.4 Generation of trajectories and machine code for manufacturing;</p> <p>2.11.5 Transfer to the controller of the additive manufacturing system.</p> | |
| <p>2.12</p> | <p>The entire system must allow safe management of metal powders:</p> <p>2.12.1 The powder must be able to be maintained under a controlled atmosphere (the internal build chamber atmosphere must be inert) throughout its use, from the transfer of the powder containers to the equipment tanks, the transfer of the tanks into the machine, the manufacture of the samples, the cleaning of the samples, recovering the unused powder, sieving the unused powder, transferring it to the original containers. The building chamber must be filled with inert gaz (Nitrogen or Argon) with an O2 content below the limit mentioned in the specifications.</p> <p>2.12.2 The powder used must be sieved to exclude sintered particles that have a size greater than 50 µm.</p> <p>2.12.3 The system must be delivered with accessories for safe cleaning of additive manufacturing equipment. This may include explosion-proof powder suction equipment. The device must be provided at delivery even if it is from a third party.</p> <p>2.12.4 To facilitate the change of materials during research activities, the system must be delivered with at least two (2) sets of accessories including, at least for each set: three (3) powder reservoirs, one (1) sieve, filters and tubing required for equipment to operate without contamination.</p> <p>2.12.5 The system must be equipped with filters to recover ultrafine powders (submicron) and vaporized elements during manufacture.</p> | |

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|------|---|--|
| | <p>2.12.6 The containers of powders that can be heavy, the transport and the loading of these items in the additive manufacturing system must be done by means of a conveyor.</p> | |
| 2.14 | <p>Communication:</p> <p>2.14.1 The control software must be able to slice the 3D models of the parts, position them and specify the process parameters associated with each slice or group of slices. Slices and group of slices can be interpreted as layers and group of layers. The request is for the software to be able to modify or adjust parameters for specific layers or group of layers during the build of parts and/or specimens.</p> <p>2.14.2 The control system must allow the adjustment of the manufacturing parameters</p> <p>2.14.3 The manufacturing parameters must be in a database accessible in read and write mode.</p> <p>2.14.4 The user must be able to create, save and modify the manufacturing parameters</p> <p>2.14.5 The system must have a USB communication port and an Ethernet communication port</p> <p>2.14.6 The system software must allow direct access to a controller that functions similarly to a SCADA port.</p> <p>2.14.7 The CNC must allow access to add additional tags or process parameters to the SCADA bus.</p> <p>2.14.8 The CNC must be able to interact with other external controllers (SCADA Type) as required via a time-enabled and network-enabled Ethernet interface for control signals</p> <p>2.14.9 The CNC must have the ability to bi-directional communication on internal memory tags, process variables and sensor data with a SCADA via an OPC UA, MQTT or any other websocket protocol.</p> | |

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MTA-9-42210

Buyer ID - Id de l'acheteur
MTA030
CCC No./N° CCC - FMS No./N° VME

ANNEX "D"

ELECTRONIC PAYMENT INSTRUMENT

The Bidder accepts any of the following Electronic Payment Instrument(s):

- VISA Acquisition Card;
- MasterCard Acquisition Card;
- Direct Deposit (Domestic and International);
- Electronic Data Interchange (EDI).

