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SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

Title - Sujet Prototyping and Prod. 3D Printer
Syst.d'impression 3D de Métaux pour prototypage et production

Solicitation No. - N° de l'invitation W1985-213230/A	**Amendment No. - N° modif.** 001
Client Reference No. - N° de référence du client W1985-213230	**Date** 2021-06-18
GETS Reference No. - N° de référence de SEAG PW-$MTA-555-16192	
File No. - N° de dossier MTA-1-44035 (555)	**CCC No./N° CCC - FMS No./N° VME**

Solicitation Closes - L'invitation prend fin
at - à 02:00 PM Eastern Daylight Saving Time EDT
on - le 2021-07-13 Heure Avancée de l'Est HAE

F.O.B. - F.A.B. Specified Herein - Précisé dans les présentes
Plant-Usine: ☐ **Destination:** ☐ **Other-Autre:** ☑

Address Enquiries to: - Adresser toutes questions à: Carbonneau, Julie	**Buyer Id - Id de l'acheteur** mta555
Telephone No. - N° de téléphone (418) 929-6780 ( )	**FAX No. - N° de FAX** ( ) -

Destination - of Goods, Services, and Construction:
Destination - des biens, services et construction:

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	**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**

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

Canada

AMENDMENT 001 :

1) AMEND THE REQUEST FOR BID

DELETE Annex A - Requirement and INSERT this following Annex A:

ANNEX "A" – REQUIREMENT

1. SCOPE

1.1. PURPOSE

The purpose of this annex is to describe the requirements and the work effort required from the supplier to the 202 Workshop Depot (202WD) maintenance group to provide the necessary equipment and services, such as delivery, installation, commissioning and training, in order to meet the requirements for the purchase of a Metal 3D Printing System for Prototyping and Production.

1.2. WORK GOAL

The Desktop Metal 3D printing system is required because:

The international standardization bodies ISO and ASTM work in collaboration on the development of standards dedicated to the additive manufacturing (AM) sector thanks to the ISO / TC 261 and ASTM F42 Technical Committees, most of the standards of which are still in the development phase. Currently, there are few standards that deal specifically with the mechanical properties of parts manufactured by A.M. of Metals, creating challenges in providing equal comparisons between machines, materials and models that predict the final properties of the parts. Also, the rapid evolution of A.M. has forced manufacturers to develop their own production and qualification standards and specifications. To achieve this, they thoroughly study the processes within their R&D department, including understanding the risks and limitations and defining operating strategies, sampling methodologies, testing techniques, and operator requirements

Monitoring the quality of a product manufactured by A.M. must be different from that of a product manufactured in a conventional manner. Gradually adding material to build a part means that the properties of the material constituting that part are very dependent on the type of machine and the process parameters. It is not yet possible to accurately predict the final properties of the material without coupling them to a machine and its set of manufacturing parameters. Also, each step of the overall process must therefore be clearly defined: the choice of design, the orientation of the part, the choice of post-processing influence the repeatability during the production of large series of parts.

At the level of the Ministry of National Defense, the 202WD initiative will be used to develop standards and specifications for metal parts manufactured by A.M. for military applications, which do not yet exist. In this matter, the 202WD will acquire different A.M. machines operating under various technologies over the next few years.

The Royal Canadian Navy already uses this precise system at its Installations in Nova Scotia and Ontario. It is required in order to share research and progress concerning the A.M. of metals.

1.3. BACKGROUND

The 202WD is a Canadian Armed Forces (CAF) repair unit, located in Montreal, Quebec, which provides maintenance services. The unit's duties is to repair and recondition all land equipment and CAF materiel.

A detachment from 202WD, called the Land Engineering Support Center (LESC), located in Ottawa, Ontario, specializes in engineering for equipment upgrades. As part of its work, the 202WD is focused on designing, manufacturing and integrating improvements to land equipment in the form of prototypes.

202WD, located in Montreal, desires to acquire one (1) Metal 3D Printing System for Prototyping and Production.

To meet the growing demand for functional prototypes, the use of a metal 3D Printing System allows to manufacture parts, components and to support production. Manufactured parts can be tested exhaustively. In summary, it helps in engineering design and development.

2. APPLICABLE DOCUMENTS

2.1. APPLICABILITY

The documents listed in section 2.3 establish mandatory standards that apply and form part of the Annex A. The Contractor is responsible for ensuring that he has obtained the most recent versions of each document. The version of the documents below is in effect at the time the execution of the contract becomes effective and forms part of the Annex A. All other reference documents contained elsewhere are to be considered as sources of additional information only.

2.2. PRIORITY ORDER

In the event of a conflict between the content in this Annex A and the reference documents, the content of this Annex A takes precedence.

2.3. NATIONAL DEFENCE DOCUMENTS

The documents below are part of this document to the extent indicated by it. The version of the document which is in effect on the date of the Solicitation will apply unless specified otherwise

D-LM-008-002/SF-001: SPECIFICATION FOR MARKING FOR STORAGE AND SHIPMENT

D-LM-008-036/SF-000: DEPARTMENT OF NATIONAL DEFENCE MINIMUM REQUIREMENTS FOR MANUFACTURER'S STANDARD PACK

Material description and execution requirements:

SAFETY DEVICES - The machine and its controls must be equipped with the latest and most effective devices for the protection of the operator and the equipment. The covers, protections and / or other safety devices must not interfere with the operation of the machine.

INTERCHANGEABILITY - To allow replacement of worn parts, all parts with the same part number must be functionally interchangeable and must be dimensionally identical within the specified tolerance limits used by the manufacturer

CONSTRUCTION - The machine must be constructed in such a way that when installed and connected to the power supply, it must be ready for operation. The machine must be built with new parts without defects and without repairs.

SURFACES - All surfaces of casted and forged parts, stampings and welds must be cleaned and free of sand, dirt, sprues, burrs, scale, flux and other noxious or foreign matter. The edges of the outer surface should be either rounded or bevelled, unless sharpening is required to perform a necessary function. Unless otherwise specified, the condition and finish of all surfaces should be in accordance with manufacturer's standard commercial practice.

3. MANDATORY REQUIREMENTS

The Contractor must provide one (1) Desktop Metal - Studio System ™ 2 - 3D Printing System, referenced as 3D Printing System in this annex, or equivalent that meets all the requirements identified in this Annex A, at 202WD in Montreal, Quebec.

3.1. GENERAL REQUIREMENTS

3.1.1 At a minimum, the 3D Printing System must not use lasers in the manufacturing process. Volatile metal powders for raw materials are not acceptable. The 3D Printing System must be from a single manufacturer with no third party equipment or special installations required.

3.1.2 The 3D Printing System must be a process in only two or three steps, either printing, then debinding / sintering (separately or simultaneously).

3.1.3 3D Printing System requirements:

3.1.3.1 Technology
- 3.1.3.1.1 Printer Technology : Bound Metal Deposition;
- 3.1.3.1.2 Support Technology: Separable Supports;
- 3.1.3.1.3 Interface Technology: Ceramic Release Layer.

3.1.3.2 Performance
- 3.1.3.2.1 Maximum Build rate: > 15 cm^3 / hr;
- 3.1.3.2.2 Layer Height :
  - Between at least 75 and 125 µm (high resolution print head) Between at least 175 and 275 µm (standard resolution print head)
- 3.1.3.2.3 Max Build weight: > 6 kg.

3.1.3.3 Physical
- 3.1.3.3.1 External Dimensions: <100 cm x 100 cm x 60 cm (H x W x D);
- 3.1.3.3.2 Weight : < 100 kg;
- 3.1.3.3.3 Build Chamber: Heated;
- 3.1.3.3.4 Extruder Assembly : Quick-release print heads;
- 3.1.3.3.5 Extrusion head: 2;
- 3.1.3.3.6 Build Enveloppe: > 27.5 cm x 17.5 cm x 17.5 cm (H x W x D);
- 3.1.3.3.7 Build Plate: heated up to 70°C;
- 3.1.3.3.8 Vaccum build plate;
- 3.1.3.3.9 Print Sheets: Polypropylene, Peel-Away;
- 3.1.3.3.10 Build nozzle diameter:
  - <0.30 mm (high resolution print head);
  - <0.50 mm (standard resolution print head).
- 3.1.3.3.11 Power requirements: 100-130 VCA, 50/60 Hz, 15 A, 1 Phase.

3.1.3.4 Material
- 3.1.3.4.1 Material Holding: RFID-enable, hot swappable cartridges;
- 3.1.3.4.2 Material Loading: Push-to-released;

3.1.3.4.3 Detect and interrupt printing when material is empty;
3.1.3.4.4 Manufacturing support (Build media): Bounded metal rods (metal powder + wax polymer binder);
3.1.3.4.5 Interface Material: Bounded ceramic rods.

3.1.3.5 Platform
3.1.3.5.1 Network connectivity: Wireless and Ethernet;
3.1.3.5.2 Supported file types: STL, IGES, JT, STEP, VDA-FS, U3D, VRML;
3.1.3.5.3 Software: Fabricate ™ or its fully compatible equivalent;
3.1.3.5.4 Onboard control: at least 6-inch Touchscreen display;
3.1.3.5.5 Chamber view: In-chamber build plate camera;
3.1.3.5.6 Software has to be provided as a local version to be installed and tested on the DND network.

3.1.4 Debinder requirements and specifications:

3.1.4.1 Physical
3.1.4.1.1 External dimension: Less than 105 cm (closed) x 75 cm x 65 cm (H x W x D);
3.1.4.1.2 Maximum fluid volume:
Between 17.5 and 22.5 L (treatment tank);
Between 22.5 and 27.5 L (storage tank).
3.1.4.1.3 Work envelope: Greater than 30 x 20 x 20 (H x W x D);
3.1.4.1.4 Support: Stainless steel basket with adjustable tray (3 levels minimum);
3.1.4.1.5 Vapor tight tank cover;
3.1.4.1.6 Binder management: Disposable binder waste container;
3.1.4.1.7 Safety protection: Overheating shutdown control;
High vapor pressure shutdown control.
3.1.4.1.8 Integrated control: 6 inch or larger touch screen.

3.1.4.2 Solvent
3.1.4.2.1 Solvent: Dissolving fluid;
3.1.4.2.2 Chemical properties: Provide a material safety data sheet;
3.1.4.2.3 Fluid management: Automatic distillation and recycling.

3.1.4.3 Platform
3.1.4.3.1 Network connectivity: Ethernet;
3.1.4.3.2 Software: Fabricate ™ software or fully compatible equivalent;
3.1.4.3.3 Automation: automatic 2D nesting with part placement instructions;
3.1.4.3.4 Fluid level monitoring;
3.1.4.3.5 Automatically generated personalized dissolution cycle;

3.1.5 Furnace requirements and specifications:

3.1.5.1 Performance
3.1.5.1.1 Atmosphere: Partial-pressure sintering (vacuum enabled);
3.1.5.1.2 Heating: SiC heating elements (4 sides);
3.1.5.1.3 Max temperature: 1400 °C;
3.1.5.1.4 Average heat load: 8100 BTU / hr;

3.1.5.1.5 Max heat load: 15 600 BTU / hr for 2 hours;
3.1.5.1.6 Thermal uniformity: ±5 °C at sintering temperatures;
~~3.1.5.1.7 Function allowing to eliminate the need of a binder material dissolution tank ''Debinder'' by performing this directly into the oven.~~

3.1.5.2 Physical
3.1.5.2.1 External dimensions: <165 cm x 140 cm x 80 cm (H x L x P);
3.1.5.2.2 Height : <165 cm (closed), <225 cm (open);
3.1.5.2.3 Weight: <800 kg;
3.1.5.2.4 Workload envelope: 30 cm x 20 cm x 20 cm;
3.1.5.2.5 Work Support: Adjustable multi-level trays with ceramic setters;
3.1.5.2.6 Retort: Graphite ring stacking;
3.1.5.2.7 Ventilation: Effluent air exhaust; Liquid drain line (1/2 inch Push-to-connect;
3.1.5.2.8 Binder management: Removable liner for cold recovery;
3.1.5.2.9 Manipulation: Safe for fingers around pinch points;
3.1.5.2.10 Fail safes: Thermal interlocks, Front-mounted emergency stop and Overheating protection;
3.1.5.2.11 Onboard control: At least 7 inches Touchscreen display;
3.1.5.2.12 Mobility: Swivel casters with adjustable levelling locks;
3.1.5.2.13 Power requirements: 208 VCA, 50/60 Hz, 30 A, 3 phases. Must include 600V transformer.

3.1.5.3 Gas
3.1.5.3.1 Manufacturing (Forming) gaz: Argon or Nitrogen (depends on the material);
3.1.5.3.2 Gas connectivity: 900L onboard tank (canister) (x2), External gas connections.

3.1.5.4 Platform
3.1.5.4.1 Network connectivity: Wireless and Ethernet;
3.1.5.4.2 Software: Fabricate™ of its fully compatible equivalent;
3.1.5.4.3 Automation: Automatic 2D nesting with part placement instructions.

3.1.6 Printing material requirements for additive manufacturing

3.1.6.1 Performance
3.1.6.1.1 Packaging: Suitable for hot-swappable media cartridges;
3.1.6.1.2 Stainless Steel: 17-4 PH grade; 316L grade;
3.1.6.1.3 Carbon steel: H13 tool steel; AISI 4140;
3.1.6.1.4 Other metals: Copper.

3.1.7 Software requirements

3.1.7.1 FabricateTM or its compatible equivalent, simplifies model preparation and automates metal 3D printing;
3.1.7.2 Live PartsTM or its compatible equivalent, applies morphogenetic principles and an advanced simulation to generate an optimized conception of parts in minutes;
3.1.7.3 Fab FlowTM or its compatible equivalent for busy manufacturing workshops, combines communications and workflow management into a single platform;

3.1.7.4 Allows parts to be printed from .stl and .ipt format;
3.1.7.5 Includes, at least, a 3-years license for unlimited users;
3.1.7.6 The 202WD will provide the computer to run the software provided by the Vendor. The Vendor must present the minimum specifications required in order to run their software and identify if any additional material or software is required.

3.1.8 Accessories / Starting set
3.1.8.1 Three (3) rechargeable metallic material cartridges;
3.1.8.2 One thousand six hundred and twenty (1 620) cc of 17-4 material;
3.1.8.3 One thousand six hundred and twenty (1 620) cc of 316L material;
3.1.8.4 One thousand six hundred and twenty (1 620) cc of 4140 material;
3.1.8.5 One thousand six hundred and twenty (1 620) cc of H13 material;
3.1.8.6 Five (5) High-resolution print head;
3.1.8.7 Ten (10) nozzle brush;
3.1.8.8 Ten (10) rechargeable interface material cartridge;
3.1.8.9 One (1) volume of interface material to be able to fill 4 cartridges;
3.1.8.10 One Hundred (100) printing sheet;
3.1.8.11 Twenty-four (24) Binder trap liner;
3.1.8.12 Two (2) chamber O-ring;
3.1.8.13 One (1) discharge pump filter;
3.1.8.14 One liter (1 L) pump oil;
3.1.8.15 Thirty-two (32) setter plate;
3.1.8.16 Four (4) furnace part tray;
3.1.8.17 One (1) build material feed tray;
3.1.8.18 Four (4) interface material feed tray;
3.1.8.19 Nine hundred liters (900 L) of furnace Inert gas;
3.1.8.20 Forty (40) Sintering getter;
3.1.8.21 Fifty (50) L of dissolving solvent.

3.1.9 The 3D Printing System cannot be a prototype or an existing model requirering major modifications in order to comply with the requirements stated in this Annex A. The equipment must meet all the criteria and must use a technology proven within the manufacturer.

3.1.10 The 3D Printing System must be turn-key, including all parts, software and accessories needed for the proper operation of the equipment.

3.1.11 The Contractor must provide an after-sale service for a minimum duration of 2 years according to the following characteristics:
- Contract type : By phone and by email for technical questions and in person for any repair and/or maintenance;
- Expected response time for regular request: 24 hours; Urgent request: 4 hours;
- Service type: Advice, Inform, Repair.

3.1.12 The 3D Printing System must comply with CSA Z107.58-15 and CSA Z432-21 standards or equivalent.

3.1.13 The operation noise level must not exceed 80 dB (A).

3.1.14 The 3D Printing System must be compatible with 100-130 VAC, 50/60 Hz, 1 phase, 15 A and, for the oven with a power supply of 600V three-phase at 60Hz (connected to the infrastructure). If the 3D Printing System requires a different power supply, a transformer must be provided in order to connect the machine to the infrastructure. All electrical components must be approved by CSA for installation and use in Canada.

4 DELIVERABLES (FOR THE 3D PRINTING SYSTEM OF FAIR CONTRACT AND OPTIONNAL SYSTEMS)

The Contractor will have to attend a Kick-off meeting, via a Zoom conference, before the manufacturing / delivery of the equipment to ensure that the chosen installation location is compatible with the future installation of the equipment and to identify any additional requirements.

4.1 FIRM CONTRACT

One (1) 3D Printing System, all of its components and accessories, delivery, installation and training at 202WD in Montreal, Quebec.

4.2 OPTIONS

4.2.1 One (1) 3D Printing System, all of its components and accessories, delivery, installation and training at LESC in Ottawa, Ontario;

4.2.2 One (1) additional 3D Printing System, all of its components and accessories, delivery, installation and training at 202WD in Montreal, Quebec.

4.3 DOCUMENTS

4.3.1 All information that the Contractor must provide in connection with the deliverable must be provided in English and, if possible, in French;

4.3.2 The Contractor must provide all documents electronically, including receipts, instructions and operation manuals, maintenance plan, training, parts list and all other relevant documentation within 30 working days following the award of contract.

4.3.3 The Contractor agrees to provide, within 30 working days of contract award, all technical documentation for all infrastructure resources required for the operation and installation of the equipment. These technical documents must mention the types of power supply resources as well as the values in metric or imperial units. The set of installation drawings for the 3D Printing System described in this Annex A must include all floor mounting pedestal recommendations, description of the anchor holes and their locations, if necessary, as well as any requirements of the machine: electricity, compressed air, water, etc.

4.3.4 The Contractor must provide to the Technical Authority (TA) the following manuals:

- Operator’s manual;
- Installation manual;
- Parts manual;
- Maintenance manual;
- Electrical circuits schematics;
- Calibration, Tests and Tolerancing documentations.

4.3.5 The Contractor must provide at least two (2) hard copies and one (1) electronic copy in PDF format, the text of which is searchable. These copies must be provided for each document.

4.3.6 The Contractor must provide an authorization letter that allows the reprints of manuals or section of manuals from electronically submitted copies. The authorization letter must be delivered in person or mailed to the TA of 202WD or its designated representative. The signed contract associated with this Annex A serves as a reprint acceptance.

4.3.7 The Contractor must provide an installation plan for the equipment and all its components, based on the layout plan provided by the 202 WD in DWG version (compatible with AutoCAD version 2014 or later). The installation plans must meet the following conditions:

- The drawing of the equipment according to the actual dimensions of all its components
- All equipment must be contained and shown in the plan
- The plan must include at least the overall dimensions of equipment and its components.

4.3.8 All document deliverable must be sent electronically in a format that is compatible with the Microsoft office suite, or in a format that is acceptable to the TA.

4.3.9 The Contractor must provide delivery reports to the TA which describes when the equipment will be received by the Contractor and when it will be shipped to the 202WD.

4.4 WARRANTY

Each 3D Printing System must be guaranteed for a minimum period of two (2) years. The Contractor will be responsible for providing labor, parts and on-site service at their own expense during the warranty period and must repair all defects within fifteen (15) working days of being notified by the TA or his designated representative that the equipment is defective. All other warranties greater than that specified in this Annex A will be considered valid.

4.5 SOFTWARE

Each 3D Printing System must have all updates included, on all its software, for a minimum period of three (3) years.

4.6 DELIVERY

The reception must be done using a forklift. Delivery sites have an unloading dock.

4.7 INSTALLATION AND COMMISSIONING

4.7.1 The 202WD requires a turn-key installation. All work must be carried out during the normal work week (Monday to Friday) and during business hours (7:00 a.m. to 3:00 p.m.).

4.7.2 The Contractor must provide all personnel, materials, equipment, software and accessories needed for installation, verification, calibration and commissioning of the equipment on site. The Contractor must bring to the site all materials and tools necessary for the installation, commissioning and training.

- All supplied personnel should be considered qualified by the Contractor to direct the delivery, installation, commissioning and training.
- The installation and commissioning must be done upon delivery of the equipment, or **not later than** 30 calendar days after delivery of the equipment.

4.8 TRAINING

4.8.1 The operator's training will take place where the equipment's have been delivered. The training must have minimum duration of 16 hours. Depending on the required time, less than 16 hours may be used at the discretion of the 202WD. It must be given in English or if possible in French. The contractor will be paid for the hours he has reasonably and properly performed.

4.8.2 The operator's training will cover safety, introduction to the 3D Printing System, operating the 3D Printing System, use of the control console, use of the software's and preventive maintenance operations. The minimal duration is the ensure that the training cover adequately the material. At least eight (8) operators must be able to attend the training. The training must be carried out by a trained technician or a Contractor's technical service representative.

4.8.3 The training must also include a minimum period of four (4) hours where operators will be able to test the 3D Printing System at their discretion in order to assess the capabilities of the 3D Printer System and practice the elements presented during training. All documentation used during training (videos, PowerPoints, etc.) must be submitted electronically to the TA.

4.8.4 The training must be given upon delivery and/or installation or not later than 30 calendar days after delivery of the equipment.

4.9 MINISTRY OF NATIONAL DEFENCE RESPONSIBILITIES

The installation area will be free of all non-essential material. The installation of plumbing, ventilation and electrical connections required as needed for the equipment is assumed by the 202WD. The 202WD will provide the labor, forklift operator and forklift to lift the machine from the delivery vehicle and move it to its final location inside the building. The 3D Printing System must be delivered to the site in one shipment ready for installation. The 202WD may choose to provide observers to monitor the assembly of the system. Any new material should not be brought to the site until the day of installation. The 202WD will not be responsible for the storage or loading / unloading of the Contractor's material before this date.

4.10 ADRESSES FOR DELIVERY

All deliverables must be shipped to the following adress:

Firm Contract :

202 Workshops Depot
6769 Notre Dame Est, building 10 South
Montreal, Quebec, Canada
H1N 1X9

Option Contract :

202 Workshops Depot
6769 Notre Dame Est, building 10 South
Montreal, Quebec, Canada
H1N 1X9

AND / OR

Land Engineering Support Center (LESC)
CFB Uplands, Building 55
720 Bluenose Pvt
Gloucester, ON (Ottawa)
K1V 7M9

4.11 CONTRACTOR'S CONSIDERATION

During a visit to the installation site, the Contractor must inform the TA at least 15 working days prior to the visit with the name of the personnel that will be present to obtain the necessary authorizations. In addition, the Contractor must have previously obtained security clearances for all employees that will work on the Garrison.

DELETE Annex C – Mandatory Technical Criteria that must be demonstrated and INSERT this following:

ANNEX "C" – MANDATORY TECHNICAL CRITERIA THAT MUST BE DEMONSTRATED

MTC No	Mandatory Technical Criteria (reference to Annex A)	Reference: Should specify where these technical criteria are demonstrated within your technical bid (Page #, section # or title and/or document's title).
MTC 1	The Bidder must provide details of two (2) contracts of similar scope * over the past four (4) years. By "similar scope" is meant a contract for the acquisition of a 3D printing system for a minimum value of $ 250,000.	
MTC 2	Criterion 3.1.1: At a minimum, the 3D Printing System must not use lasers in the manufacturing process. Volatile metal powders for raw materials are not acceptable. The 3D Printing System must be from a single manufacturer with no third party equipment or special installations required.	
MTC 3	Criterion 3.1.2: The 3D Printing System must be a process in only two or three steps, either printing, then debinding / sintering (separately or simultaneously).	
MTC 4	Criterion 3.1.3.1.1 : Printer Technology : Bound Metal Deposition	
MTC 5	Criterion 3.1.3.1.2 : Support Technology: Separable Supports	
MTC 6	Criterion 3.1.3.2.1 : Maximum Build rate: > 15 cm^3 / hr.	
MTC 7	Criterion 3.1.3.2.2: Layer Height: Between at least 75 and 125 µm (high resolution print head) Between at least 175 and 275 µm (standard resolution print head)	
MTC 8	Criterion 3.1.3.3.3 : Build Chamber: Heated	

MTC 9	Criterion 3.1.3.3.5 : Extrusion head: 2	
MTC 10	Criterion 3.1.3.3.6 : Build Enveloppe: > 27.5 cm x 17.5 cm x 17.5 cm (H x W x D)	
MTC 11	Criterion 3.1.3.4.3 : Detect and interrupt printing when material is empty	
MTC 12	Criterion 3.1.3.4.4 : Manufacturing support (Build media): Bounded metal rods (metal powder + wax polymer binder)	
MTC 13	Criterion 3.1.3.5.3 : Software Fabricate™ or its fully compatible equivalent	
MTC 14	Criterion 3.1.5.1.1 : Atmosphere: Partial-pressure sintering (vacuum enabled)	
MTC 15	Criterion 3.1.5.1.3 : Max temperature: 1400 °C	
MTC 16	Criterion 3.1.5.1.6 : Thermal uniformity: ±5 °C at sintering temperatures	
MTC 17	Criterion 3.1.5.2.4 : Workload envelope « for sintering »: 30 cm x 20 cm x 20 cm	
MTC 18	Criterion 3.1.5.2.7 : Ventilation: Effluent air exhaust; Liquid drain line (1/2 inch Push-to-connect)	
MTC 19	Criterion 3.1.5.3.2 : Gas connectivity: 900L onboard tank (canister) (x2), External gas connections	
MTC 20	Criterion 3.1.6.1 Performance 3.1.6.1.1: Packaging: Suitable for hot-swappable media cartridges 3.1.6.1.2: Stainless Steel: 17-4 PH grade; 316L grade 3.1.6.1.3: Carbon steel: H13 tool steel; AISI 4140 3.1.6.1.4 : Other metals: Copper	

**** ALL OTHER TERMS AND CONDITIONS REMAIN THE SAME****