

Appendix 2: Conformity with Technical and Functional Specification
Tenderers must complete Appendix 2 in full and sign it. Tenderers must complete the tables below.
This Appendix must be completed with reference to Section 2 of the RFT and Appendix 1 for Lot 1 of the Instructions to Tender – *Specification of Requirements under the Framework*.
Where a Tenderer cannot meet a Mandatory (M) requirement, they shall be eliminated from the competition.
This section will be evaluated on a Pass/Fail basis.
Mandatory requirements will be assessed on a Pass/Fail basis. Desirable (D) requirements should be addressed where applicable.
This section will be evaluated on a Pass/Fail basis.
M = Mandatory, D = Desirable.

Lot 1 Multi-Metal Laser Directed Energy Deposition (DED) Additive Manufacturing System -Technical Requirements		
General Requirements (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The Direct Energy Deposition Metal 3D Printer MUST be capable of printing 6 metal powders within the same build. Ideally, users can define printed components to be manufactured either as a single material, a combination of up to 6 materials with solid interfaces, or the 6 metals can be combined into a layer-by-layer gradient or uniquely alloyed for high entropy alloy research. The system Must comprise a metal 3D printer utilising a high-power laser (minimum 700W laser power) to melt the metal as it is deposited to the layer wise printed component. The system MUST be capable of working with multiple metal materials in powder form. The machine must have user-programmable settings to control machine parameters on an as-needed basis alongside closed loop control. This tender competition will consider metal additive manufacturing (AM) equipment that applies the following metal additive manufacturing technologies: - Directed Energy Deposition (DED) - Laser Metal Deposition (LMD) - Or other similar approaches Tenderers MUST clearly outline the proposed technology.	Choose an item.	
Lot 1 Multi-Metal Laser Directed Energy Deposition (DED) Additive Manufacturing System -Technical Requirements		
System Type and Core Technology (M)	Compliant Confirm Yes/No please use the drop down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Mandatory: The system MUST be a Directed Energy Deposition (DED) metal additive manufacturing system utilising a high-power laser.	Choose an item.	<i>Insert Comment</i>
Laser Requirements (M & D)	Compliant Confirm Yes/No please use the drop down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Mandatory: The system MUST: - Provide a minimum laser power ≥500W - Compliance with EN60825-1 laser safety standards Desirable: The system should: - Provide laser power ≥700W - Include adjustable beam diameter ≤400 µm	Choose an item.	<i>Insert Comment</i>

Material Compatibility (D)	Compliant Confirm Yes/No please use the drop down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The proposed system SHOULD process a range of engineering materials, including: • Titanium alloys (Ti6Al4V) • NiTi • Stainless steels • Nickel-based alloys (e.g. Inconel) • Tool steels • The tenderer MUST provide: • A full list of compatible materials (developed and in development) • Details of any material limitations	Choose an item.	Insert Comment
Atmosphere Control (M/D)	Compliant Confirm Yes/No please use the drop down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The proposed system SHOULD use an inert gas supply to remove oxygen from the build environment. This can be either through the use of gas shielding or using an inert atmosphere through a build chamber purge. Ideally, both purge methods are available. The chamber MUST have a class-1 leak rate that maintains O2 levels ≤50ppm for high-quality metallurgy and print control. Mandatory: The system MUST have: • Controlled atmosphere with oxygen levels ≤50 ppm Desirable: The system SHOULD have: • Both inert gas shielding and chamber purge options	Choose an item.	Insert Comment
Build Volume and Motion (D)	Compliant Confirm Yes/No please use the drop down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The minimum build envelope SHOULD be at least 150mm x 150mm x 150mm. The equipment SHOULD use a high-precision, 3-axis motion control for the precise deposition of the metal alloys during printing. The build plate SHOULD have a preheating/ temperature control functionality to provide an insulating effect for high-temperature refractory-type metals. Note that it is acceptable for such a system to reduce the 150mm z- height requirement, such cases should be defined.	Choose an item.	Insert Comment

Safety and Enclosure (M)	Compliant Confirm Yes/No please use the drop down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Where the build volume has a view window, the safety cover & tinted glass/Perspex etc and the enclosure for the cabinet doors MUST be CE compliant for laser safety. The moving and hazardous components of the equipment (namely the laser head, powder feeding system and build volume MUST be fully enclosed (top, bottom and sides) in a CE-compliant enclosure with appropriate interlocks for the equipment's safe functionality. The enclosure MUST be sealed with a controlled atmosphere for optimised process control. The system MUST: • Be fully enclosed with CE compliance • Include interlocks, emergency stops, and laser-safe viewing protection • Ensure safe containment of hazardous components	Choose an item.	Insert Comment
Physical and Space Requirements (M)	Compliant Confirm Yes/No please use the drop down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The maximum external system dimensions MUST not exceed 690mm * 690mm * 1400mm. Note: This requirement applies only to the core system and does not include ancillary equipment or accessories such as chillers, vacuum units, gas supply equipment, extraction systems or similar items. The system weight SHOULD be no more than 300kg, excluding ancillary equipment accessories. The overall operational footprint of the system, including required operator access, maintenance access, and any integrated accessories SHOULD not exceed 2000mm * 2000mm. The overall installed height of the system, including light beacons, HMI arms, and any other attached components (where applicable), SHOUD not exceed 2200mm.	Choose an item.	Insert Comment
Electrical Requirements (D)	Compliant Confirm Yes/No please use the drop down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system Should use a single-phase input voltage of 220 V, and a full load current not exceeding 15A.	Choose an item.	

Mandatory Functional Requirements Lot 1 – Multi-Metal Laser Directed Energy Deposition (DED) Additive Manufacturing System		
Open System Access and Control (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system MUST provide full open access to system parameters to allow work with new and non-OEM materials at zero cost to the Contracting Authority and MUST not be tied to proprietary build files requiring purchase from the Tenderer or any third party.	Choose an item.	Insert Comment
Post-Processing (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The built components from the proposed solution MUST not require de-binding, post-sintering or curing processes to make them serviceable.	Choose an item.	Insert Comment
Monitoring and Data Logging (D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The proposed solution SHOULD be capable of monitoring and logging process data for each print for research and teaching purposes.	Choose an item.	Insert Comment
Expandability (D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system SHOULD be designed to allow the future integration of high-speed and/or thermal cameras, and other non-OEM process monitoring sensors for research purposes. Where such integration has previously been achieved, Tenderers SHOULD provide relevant examples.	Choose an item.	Insert Comment
Material Density (D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Please provide the as-built densities achievable for each of the materials qualified for the equipment. The minimum allowable SHOULD be >96%. .	Choose an item.	Insert Comment
Proposed Monitoring (D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system SHOULD have process monitoring capabilities. Example applications may include • Melt pool, • laser power, • O2 ppm, and • Scan speed analysis from within the build volume.	Choose an item.	Insert Comment

These capabilities may be provided through integrated sensors and/or through the availability of process data. Tenderers MUST detail all standard monitoring capabilities provided, and where optional extras are required to meet this requirement, these MUST be identified and included in Appendix 2 Pricing Schedule.		
Filtration (D)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The proposed system SHOULD have built in filtration for the exhaust air and minimise the need for external extraction..	Choose an item.	Insert Comment
Software Licensing and Updates (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
. All software, firmware and associated licences required for the full operation of the system MUST: • Be supplied with perpetual licences. • Be fully functional and unrestricted for the intended use of the system. • Be included within the total tendered price. • Include all licence fees necessary for installation, operation, maintenance and administration of the system. The Tenderer MUST provide evidence that the software platform is actively maintained and supported by the manufacturer. As a minimum, the Tenderer MUST provide evidence of software releases, updates, patches, enhancements or version updates issued within the previous three years. The Tenderer MUST provide all software updates, firmware updates, bug fixes, defect corrections and security patches necessary to maintain the supplied system in a fully functional, secure and supported state during the warranty and support period, at no additional cost. Any defects or faults affecting the functionality, performance or security of the supplied hardware, software or firmware MUST be remedied by the Tenderer at no additional cost during the warranty and support period. The Tenderer MUST ensure that all software and firmware are maintained in a secure state, including the timely provision of security patches and updates to address known vulnerabilities, in accordance with applicable Irish and EU cybersecurity, information security, data protection and other relevant legislative requirements. .	Choose an item.	Insert Comment
Build Preparation and Control Software (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system MUST be supplied with all required build preparation software and any other software required for operation of the equipment. The system MUST include software for:	Choose an item.	Insert Comment

• Build preparation and positioning • Slicing and toolpath generation • Process parameter control • Layer/ Part material composition The system MUST be supplied with at least two licence seats for the build preparation software and any other software required for operation of the equipment. Typical capabilities should include: • Single-line melt experimentation and control • Build positioning • Slicing of components • Advanced use of lattices • Support design • Build simulation.		
Software Capability (D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
It is desirable that the Software should support: • Lattice structures • Build simulation • Advanced process experimentation The machine SHOULD have basic material parameter sets available. The supplier SHOULD detail and outline all material parameter sets provided.	Choose an item.	Insert Comment
Software Access and Data Export (M/D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Mandatory: The proposed solution MUST support: • Data export functionality (e.g. CSV or equivalent) Desirable: The system SHOULD: • Provide USB and/or Ethernet ports for data export • Support Ethernet and/or wireless connectivity • Enable export of process parameters (e.g. laser settings, material parameters)	Choose an item.	Insert Comment
User Interface (D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
It is desirable that the proposed system SHOULD include: • A user-friendly human-machine interface (HMI) panel/screen for process control and monitoring at the machine. The user interface should be designed in accordance with recognised usability and accessibility principles, including compliance with applicable Irish and EU accessibility requirements for digital systems where relevant.	Choose an item.	Insert Comment

Hardware, Compatibility and Integration (M/D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Mandatory: Where applicable, the system MUST include: • All necessary computer-related hardware required for operation Desirable: The system SHOULD include: • Required cables and accessories • Capability for data collection, analysis, and export • Provision of associated documentation in English	Choose an item.	Insert Comment
Operating System Requirements (M/D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Mandatory: • Data export and file preparation software MUST operate on Windows 11 Desirable: • The equipment software SHOULD operate on an operating system no older than Windows 11 or equivalent where an industrial operating system is used	Choose an item.	Insert Comment
Ancillary Equipment (M/D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Mandatory: The proposed solution MUST: Include all equipment required for the safe and correct operation of the system, including: • A closed-loop heat exchange chiller where required for the correct functionality of the system, including all necessary heat exchange fluids (excluding water) • Additional accessories required for day-to-day operation of the metal 3D printer, even if not explicitly stated elsewhere in the specification. Desirable: It is highly desirable that the proposed solution is provided with: • Powder handling tools, e.g. ○ laboratory tower sieve and appropriate sieves, ○ powder separation vacuum cleaner/separator for cleaning and recovering metal powders ○ Powder PPE (respirator, antistatic mat, gloves etc.)	Choose an item.	Insert Comment

○ Gas regulator(s), suitable for Argon and/or Nitrogen gas.		
Starter Kit (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The proposed solution MUST include: • A minimum of 40 kg of metal powders across multiple materials, including material variation (e.g. approximately 4 kg per material) suitable for demonstrating the system's alloying capabilities • Sufficient powder quantities to be used across all material feed systems (e.g. six hoppers) • A minimum of five build plates. • A minimum of ten nozzles suitable for the powder sizes of the supplied metals in the starter kit • All necessary consumables in sufficient quantity to ensure the system is fully operational from first startup and capable of producing multiple printed parts • This starter Kit MUST also be priced as an optional extra in Appendix 2 Pricing Schedule , so that it will be available to purchase in addition to the kit supplied with the proposed solution at a future date.	Choose an item.	Insert Comment
Safety Requirement (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system/solution MUST be designed to operate safely within a research laboratory environment without introducing unacceptable risks to personnel, facilities, or the environment.	Choose an item.	Insert Comment
Safety and Regulatory Compliance (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The proposed system MUST be designed, manufactured, and operated in accordance with all applicable EU safety, health, and environmental regulations. The system MUST: • Be CE marked and fully compliant with all relevant EU Directives, including (where applicable): ○ Machinery Directive • Low Voltage Directive ○ EMC Directive Comply with EN60825-1 for laser safety Tenderers MUST provide documentation demonstrating compliance and certification.	Choose an item.	Insert Comment

System Enclosure and Operator Protection (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system MUST: - Be fully enclosed to prevent operator exposure to hazardous components, including the laser source, powder delivery system, and build area - Include laser-safe viewing panels where applicable - Incorporate interlocked access doors to prevent operation when open - Ensure safe containment of powders and emissions during operation	Choose an item.	Insert Comment
Atmosphere and Hazardous Material Safety (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system MUST: - Maintain a controlled atmosphere within the build environment - Safely manage inert gases used during operation - Include measures to minimise risks associated with metal powders (e.g. dust, combustion, inhalation) Where applicable: - Compliance with ATEX requirements MUST be demonstrated, or justification provided where ATEX classification is not required	Choose an item.	Insert Comment
Emergency and Safety Systems (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system MUST include: - Emergency stop (E-stop) functionality, accessible to operators - Fault detection and safe shutdown capability - Warning systems (visual and/or audible) for operational hazards	Choose an item.	Insert Comment
Electrical and Mechanical Safety (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The system MUST: - Ensure all electrical components are safely enclosed and compliant with relevant standards (EU and Irish) - Minimise risk from moving parts through guarding and interlocks - Be safe under normal use, maintenance, and foreseeable misuse	Choose an item.	Insert Comment
Ventilation, Filtration and Emissions Control (M/D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
Mandatory: The solution MUST manage	Choose an item.	Insert Comment

• Safe handling and containment of process emissions Desirable: It is desirable that the proposed solution should have: • Integrated filtration system • Reduced reliance on external extraction systems		
Documentation and Risk Information (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The tenderer MUST provide: • Full safety documentation in English • Operating manuals, risk assessments, and hazard information • Clear instructions for safe installation, operation, and maintenance	Choose an item.	Insert Comment
Training and Safe Operation (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide a response under each heading relating to the solution in the response boxes below. (Please describe in 300-500 words how this will be achieved. A mere affirmation will not suffice)
The supplier MUST: • Provide safety training as part of system commissioning • Ensure operators are trained in safe handling of lasers, powders, and gases • Include instruction on emergency procedures	Choose an item.	Insert Comment

SIGNED	Company
(Authorised Signatory)	
Print name	Address
Date	