

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 the Multi-Material Drop-on-Demand (DoD) inkjet 3D printing system of the Instructions to Tender – Specification of Requirements under the Framework. This Appendix will be evaluated on a Pass/Fail basis. Failure to meet any Mandatory (M) requirement will result in elimination from the competition. Desirable (D) requirements are not assessed on a Pass/Fail basis and failure to meet them will not result in exclusion from the competition.

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M = Mandatory, D = Desirable.

Please ensure that you sign the document upon completion and Insert the Company Name Below.

TENDERER NAME:

Lot 1: Multi-Material Drop-on-Demand (DoD) Inkjet 3D Printing / Deposition System -Technical Requirements

General Requirements (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The multi-material Drop-on-Demand (DoD) inkjet 3D printing system MUST be suitable to support advanced research in: - Advanced manufacturing - Smart materials - Biomedical engineering - Pharmaceutical - Biosensors - Functional coatings The system MUST provide a flexible, open, high-precision research platform capable of supporting: - Multi-material printing - Handling a wide range of functional inks - Supporting heated materials including waxes and phase-change materials - High-accuracy gantry motion - Supporting real-time droplet visualisation and optimisation Tenderers MUST clearly outline the proposed technology. The proposed system must be a currently supported production model. Tenderers MUST identify the exact make and model proposed. References to product families, series, platform names, or equivalent products will not be accepted.	Choose an item.	

Multi-Material Drop-on-Demand (DoD) Inkjet 3D Printing / Deposition System -Technical Requirements

Multi-Material Printing Capability (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST: - The system MUST have at least two independently controllable dispensing unit (printheads and/or dispensing heads). - The system should support expansion to multiple independently controllable dispensing units to support future research.	Choose an item.	<i>Insert Comment</i>

Droplet Generation Performance (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST: • Provide digitally actuated droplet formation with fully programmable waveforms • Support droplet volumes from picolitre to sub-microlitre range • The system MUST also: • Allow full programming and modification of actuation waveforms, including: ○ Amplitude ○ Dwell time ○ Rise/fall profiles ○ Multi-pulse sequences • Provide independent waveform control for each printhead. • The system MUST NOT: ○ Restrict access to waveform parameters. ○ Impose proprietary limitations on actuator control.	Choose an item.	<i>Insert Comment</i>
Ink Compatibility (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST: • Support a wide viscosity range from low-viscosity liquids to high-viscosity functional inks. Tenderers MUST • State the minimum and maximum supported viscosity ranges at operating temperature. • Identify any limitations associated with specific printhead configurations. Tenderers SHOULD: • Provide a full list of available printhead options and supported ink types. • Specify the supported viscosity ranges. • Detail material compatibility (e.g. solvents, aqueous, nanoparticle dispersions, waxes/PCMs) • Describe any operational limitations. Tenderers may propose: • Additional printhead options, ink types or system capabilities that can be integrated at a later stage. • Outline upgrade options, or modular configurations to extend material compatibility or viscosity range.	Choose an item.	<i>Insert Comment</i>
Heated Ink Cartridge for Wax/Phase-Change Materials (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST either include, or be capable of being upgraded to include:	Choose an item.	<i>Insert Comment</i>

- Be capable of supporting at least one actively heated ink delivery module, either as part of the initial configuration or as an upgrade/add on within the terms of the framework agreement. - Be capable of temperature control from ambient up to $\geq 55^{\circ}\text{C}$. (Higher temperatures are desirable.) - Maintain temperature stability of $\pm 1^{\circ}\text{C}$ or better. - Ensuring stable rheological behaviour during printing.		
Drop-Watching and Jetting Visualisation (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST either include or be capable of being upgraded to include: - An integrated real-time droplet observation system for tuning and optimisation. The specific imaging method (e.g. strobe LED, pulsed laser) is at the vendor's discretion. Tenderers should state their system's achievable pixel resolution and demonstrated volume/velocity measurement accuracy or repeatability. - High-resolution imaging of droplets in flight, from at or near the point of ejection at the nozzle through a sufficient downstream distance to characterize droplet shape, velocity, and trajectory. - The system MUST have the capability to provide droplet analysis outputs including: - Measurement of: - Droplet shape - Velocity - Volume - Satellite formation - The system MUST allow full access to: - Raw data - Processed data - Export in standard, non-proprietary formats	Choose an item.	Insert Comment
Open, Refillable, and Reusable Ink Cartridges (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST: - Use fully refillable and reusable ink-wetted components: - Cartridges - Reservoirs - Nozzles - Connectors - NOT rely on: - Proprietary single-use ink cartridges The system MUST provide: - Full user access to cleaning, purging, and refilling of ink paths - Documented cleaning procedures and recommended solvents - Wetted materials that are chemically compatible with a wide range of inks	Choose an item.	Insert Comment
Mechanical and Motion System Requirements (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
Mandatory: The system MUST:	Choose an item.	

Provide XYZ travel at least $\geq 200 \text{ mm} \times 100 \text{ mm} \times 100 \text{ mm}$. (Larger travel ranges are desirable) - Achieve: Accuracy: $\pm 25 \text{ }\mu\text{m}$ or better Repeatability: $\pm 5 \text{ }\mu\text{m}$ or better Tenderers MUST specify system resolution for all motion axes. The system MUST support: - Point-to-point motion - Vector-based motion. - Continuous path printing Desirable: The it is desirable that the proposed solution SHOULD have: 5-axis printing - Print speeds greater than $>100 \text{ mm/s}$. A higher speed is preferred.		
Software Requirements (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST include software capable of: - Controlling: - Motion axes - Printheads or dispensing heads - Substrate Temperature - Environmental modules - Importing CAD/vector formats (e.g., DXF) - Supporting scriptable and automated workflows - Integrating with camera systems for alignment and monitoring Tenderers MUST provided: - Operating system requirements. - Network requirements (if applicable). - Data storage requirements. - Backup and recovery. - Third party software dependencies - Cyber and Data Protection Protocols under Irish and EU Law where applicable.	Choose an item.	Insert Comment
Software Licensing and Updates (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
All software and firmware associated with the system MUST: - Be supplied with perpetual licences. - Be fully included in the total system cost. - Not require recurring licence fees for core functionality The supplier MUST: - Provide software updates, bug fixes, and security patches for the duration of the warranty and any support/maintenance agreement. - Ensure that all updates are provided at no additional cost during this period. - Demonstrate ongoing software development and support, including mechanisms for updating deployed systems.	Choose an item.	Insert Comment
Cyber Security and Compliance (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.

The Tenderer MUST ensure that: • All software and firmware are maintained in a secure state. • Security patches and updates are provided promptly. The system MUST comply with applicable: • EU cybersecurity requirements • Data protection legislation (e.g., GDPR where applicable under Irish and EU Law) The system SHOULD: • Support secure update mechanisms. • Avoid known vulnerabilities in third-party software components.	Choose an item.	Insert Comment
Environmental Control and Substrate Handling (M/D)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
Mandatory: The system MUST include: • Suitable Substrate fixtures where applicable: ○ Slide holders ○ Well-plate holders ○ Vacuum clamping platform • Substrate heating $\geq 80^{\circ}\text{C}$ • Printhead cleaning and maintenance capability (e.g. integrated washing station, automated maintenance station, or equivalent cleaning solution). Tenders MUST specify: • Operating temperature range. • Storage temperature range. • Relative humidity requirements. • Any vibration or environmental sensitivity considerations. Enhanced Capability (D) The system SHOULD support: • Humidity control • Ionisation • Laminar flow and/or HEPA filtration	Choose an item.	Insert Comment
Accessories and Ancillary Equipment (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST include: • Printhead mounting mechanisms. • A safety enclosure or hood • A suitable system frame or support structure • The system SHOULD include a starter kit sufficient to enable immediate installation, commissioning, and operation, . The starter kit SHOULD include: • Initial set of printheads and/or nozzles as needed for operation. • Refillable ink cartridges or reservoirs • Cleaning and purging consumables • Recommended solvents and cleaning fluids for supported ink classes • Basic test inks or standard reference fluids (where applicable) • Calibration substrates (e.g. glass slides or equivalent) • Essential maintenance tools and consumables	Choose an item.	Insert Comment

The tenderer MUST: • Provide a detailed list of supplied and add-on accessories, starter kit contents, and consumables. • Identify any consumables or replacement parts required for operation. • Specify expected service life and replacement intervals of consumables and wear components. • Provide pricing for replacement consumables in appendix 3 pricing schedule for the Multi-Material Drop-on-Demand (DoD) Inkjet 3D Printing / Deposition System maintenance items, and spare parts.		
Safety and Regulatory Requirements (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
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
Regulatory Compliance (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The Multi-Material Drop-on-Demand (DOD) Inkjet 3D Printing System MUST be CE marked and comply with all applicable European Union directives, regulations, and harmonised standards in force at the time of supply. As a minimum, the system MUST comply with: • Machinery Directive 2006/42/EC (or applicable Machinery Regulation). • Low Voltage Directive (LVD) 2014/35/EU. • Electromagnetic Compatibility (EMC) Directive 2014/30/EU. The supplier MUST provide, with their tender submission: • An EU Declaration of Conformity for the proposed system, or, where it is not available at tender stage, a written commitment that value EU Declaration of Conformity be provided within 7 days upon request by Contracting Authority. • Relevant certification and test reports demonstrating compliance with applicable EU requirements and standards. • Details of the standards to which the equipment has been tested and certified. Failure to provide adequate evidence of compliance may result in the tender being deemed non-compliant.	Choose an item.	Insert Comment
System Enclosure and Operator Protection (M)	Compliant Confirm Yes/No please use the drop-down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST: • Include appropriate guarding or enclosure to prevent operator exposure to moving parts, heated components, and ink delivery systems. • Provide safe access to working areas during setup and maintenance. • Incorporate interlocks where access to hazardous areas is possible. • Ensure safe containment of inks and fluids during operation.	Choose an item.	Insert Comment

Hazardous Material and Thermal Safety (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST: - Safely manage functional inks, including solvents, nanoparticle dispersions, and heated materials (e.g. waxes and phase-change materials) - Include appropriate safeguards for heated components provided with the system. - Minimise risk of leakage, spillage, or exposure to hazardous substances. Where applicable, the tenderer SHOULD: - Provide guidance on the safe use of solvent based inks including any ventilation or extraction requirements.	Choose an item.	Insert Comment
Emergency and Safety Systems (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST include: - Emergency stop (E-stop) functionality accessible to operators - Fault detection and safe shutdown capability - Visual and/or audible warning indicators for system status and faults.	Choose an item.	Insert Comment
Electrical and Mechanical Safety (M)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
The system MUST: - Ensure all electrical systems are safely enclosed and compliant with relevant standards. - Provide guarding for moving components. - Be safe under normal operation, maintenance, and reasonably foreseeable misuse.	Choose an item.	Insert Comment
Ventilation and Emissions Control (M/D)	Compliant Confirm Yes/No please use the drop- down menu	Tenderers MUST provide sufficient detail under each requirement to demonstrate compliance with the specification. A simple confirmation of compliance will not be accepted. Tenderers should provide a response of approximately 300–500 words under each requirement, clearly explaining how the proposed solution satisfies the stated requirement.
Mandatory: - The system MUST be compatible with standard laboratory ventilation systems and enable safe operation with aqueous and solvent based inks. Desirable: It is desirable that the solution: - Integrated filtration or localised extraction support - Reduced reliance on external extraction systems	Choose an item.	Insert Comment

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SIGNED	Company
(Authorised Signatory)	
Print name	Address
Date	