Laser for welding/brazing and surface modification applications

PART A: Fibre laser with Welding/Brazing and Additive manufacturing system		
S No	**Details**	**Specification**
1.Technical Requirements – Laser		
1.1.	Operation	Continues wave/modulated
1.2	Output Power	2 kW or higher
1.3	Output Power Tuning	Must be required; continues or in steps
1.4	Emission wavelength	1060 nm to 1080 nm
1.5	Output power modulation rate (at maximum output power rating)	5 kHz or more
1.6	Output power stability	Within ±2 %
1.7	Guiding Laser	Red with an Output Power 0.5mW or more
1.8	Optical fibre core diameter	150 or 200 µm
1.9	Delivery fibre length	Around 20 m
1.10	Operating ambient temperature	20 to 45 °C or wider
1.11	Optical system	Optical system with cooling arrangement
1.12	Cooling	Air/Water cooling with a suitable chiller unit
1.13	Power	Standard matching with Indian requirements (240/415V/single phase, 3-phase circuit/ 50 Hz)
1.14	System connection	The system shall be connected to external computer/laptop via USB
2. Welding/Brazing and Additive manufacturing system		
2.1	Enclosure working area	500 mm width x 400 m length x 300 mm height (or more), metal chassis
2.2	Traverse	X-axis: 500 mm, Y-axis: 400 mm, Z-axis: 250 mm or more
2.3	Rotary	150 mm with 0 to 45° angle tilting

2.4	Motion	Servo drive with computer-based position control
2.5	Position Stability	within ±0.1 mm
2.6	Welding / Powder feed head	Appropriate welding head and powder feeding head and associated accessories. Should able to feed at least two powder material simultaneously
2.7	Laser safety window	300 mm x 200 mm
2.8	Laser safety level	High level (Class 4)
2.9	Door open and close	Manual
2.10	Safety goggles	Suitable Laser safety goggles must be provided
2.11.	Installation, Warranty and Maintenance	Quotation must include installation, 3 years warranty for all the components with annual maintenance
2.12	Consumables	Must include any required consumables for 3 years
2.13	Computer Control	Suitable Computer/Laptop with essential accessors (suitable controlling software)
3. Others		
3.1	Machine capability	Welding/Brazing and additive manufacturing of metals
3.2	User manual	Suitable user manual must be provided
3.3	Offer	Special Educational discount should be given to IIT Madras for the proposed laser system

PART B : Pulsed Laser for surface modifications		
1. Technical specifications		
1.1	Type of Laser	Pulsed Nd:YAG Laser
1.2	Wavelength	1064 nm, 532 nm, 355 nm
1.3	Spectral width	$\leq 1\ cm^{-1}$ (FWHM)
1.4	Pulse Energy (Variable)	1.5 J or higher at 1064 nm,

		0.75 J or higher at 532 nm, 0.4 J or higher at 355 nm
1.5	Pulse duration	5 to 10 ns
1.6	Repetition rate (Variable)	10 Hz or higher
1.7	Harmonic Modules	All harmonic modules can be attached or detached with ease and without optical realignment
1.8	Beam diameter	5 to 10 mm
1.9	Beam divergence	< 1 mrad
1.10	Energy Stability	< 3 % RMS
1.11	Pointing Stability	< 100 µrad at 1064 nm
1.12	Cooling System	Air to water cooling is preferred or close loop water cooling
1.13	Temperature Range	18 – 28 ^{o}C or wider
1.14	Optics and Safety goggles (Accessory)	The beam delivery optics must be included with accessories for vertical focussing on to target
1.15	Input Power	Standard matching with Indian requirements (240/415V/single phase, 3-phase circuit/ 50 Hz)
1.16	Operation	Computer control and full automation
1.17	Installation, Warranty and Maintenance	Quotation must include installation, 3 years warranty for all the components with annual maintenance
1.18	Consumables	Must include any required consumables for 3 years
2. Others		
2.1	Machine capability	Shot peening and surface modifications of metals
2.2	User manual	Suitable user manual must be provided
2.3	Offer	Special Educational discount should be given to IIT Madras for the proposed laser system

Other requirements	
1	**Vendors need to Quote separately for PART A and PART B**
2	Suppliers are required to provide training for atleast 1 person on programming, operation and maintenance at vendors place and also at IIT Madras free of cost
3	The complete system and its associated hardware / software should have a standard warranty of 3 years from the date of installation, commissioning and acceptance of the system at IIT Madras. Supplier modification(s) / Software upgrades shall be intimated and same will be made available free of cost during the warranty period.
4	All Technical literature /catalogues of various systems should accompany the quotation. All the documents should be in English.
5	Details of their engineer's expertise should be enclosed along with the offer and will be a key factor in the decision making.
6	The system should have compatibility with Indian environment conditions (for better power/energy stability
7	The System shall be capable of external control/triggering.
8	Long term support requirements: Major active components of the Laser (pump laser/pump diodes) should be manufactured by Vendor Company to ensure long service (availability of spare parts) of the system. Exact lifecycle of the offered unit has to be specified