Technical Specifications of 3D-Digital Image Correlation (DIC) setup

1.0   Bidder Eligibility Criteria:

I	Bidder Eligibility Criteria-I (Public Procurement – Preference to Make in India)	Class I / Class II	Local Content value	Reference, Page No.
I	Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein.			
2.0	**Bidder Eligibility Criteria-II**	**Complied/Not Complied**	**Reference Page No.**	**Remarks, If any**
1	The supplier/vendor must be an original equipment manufacturer or an authorized agent/dealer/seller of the item. The vendor should have supplied at least 2 similar units at other IITs or NITs, or national laboratories and research centres (DRDO/CSIR/BARC/IGCAR), or R&D centres of reputed multinational companies, or globally recognized universities, in the last 5 years. PO copy, or performance certificate, along with contact details (for these organizations) needs to be submitted.			

3.0 Technical Compliance:

<u>**Equipment feature:**</u>

3-D DIC system must be capable of evaluating in-plane and out-of-plane strain and displacement of the deforming specimen.

Sl.No.	Specifications	Feature	Complied/Not Complied	Reference Page No.
Technical Specifications:				
1.		Hardware (camera) to capture images.		
2.		Accessories for the camera station and to connect camera output to the computer.		
3.	**General:** The DIC system is expected to include components for image acquisition and processing such as:	Software to capture and process images		

4.		Image capture rate: Minimum 25 frames per second and the option to select lower than 25 frames per second. (Eg: 1 to 10 frames per second for short-duration tests and 1 to 10 frames per hour for long-duration tests)		
5.		Adaptive image capture rates given as input during the course of a test		
6.		Programmable multiple image capture rates given as input before the initiation of a test		
7.		Area of interest: $1 \text{ m} \times 1 \text{ m}$ (maximum) and $0.01 \text{ m} \times 0.05 \text{ m}$ (minimum)		
8.		Camera resolution: > 10 megapixels		
9.	**Hardware (Camera, etc.) and Image Acquisition (IA) Software**	The strain of the test specimen will typically vary between 0.05% and 2.5 %. The set of camera lenses should suitably cover the area of interest specified and should give accurate strain measurements within the strain range specified. Specify the range of focal length of the lenses that will adhere to this requirement. Further, also specify the type of lens mount.		
10.		The maximum distance from the camera station to the specimen surface without compromising on the coverage of the area of interest mentioned earlier should be specified. The details on the accuracy of DIC measurements with respect to the distance from the camera station should also be specified.		
11.		Non-metallic, telescopic tripod with 3-way leveling utilities		
12.		LED light source should have ≥ 3000 Lux		
13.		Camera should function continuously with a relatively high image capture rate (but, without getting heated or damaged) for at least 5 hours.		
14.		Camera should function continuously with a relatively low image capturing rate (but, without getting heated or damaged) for at least 5 days.		
15.		To save power, the Complimentary Metal Oxide Sensor (CMOS) is preferred to Charge Coupled Device Sensor (CCDS). Specify the sensor quoted.		

16.		Provision of filters/polarizers for noise reduction. Specify the technology quoted. Speckle kit with advanced features (e.g., air-brush). Specify the features.		
17.		Ability to record in-plane and out-of-plane displacement and calculate strain		
18.		Ability to analyze images captured by an external source (different camera/laboratory), and not necessarily from the connected hardware alone.		
19.		Provision to trigger connected cameras and the loading machine (UTM) simultaneously, ensuring synchronization.		
20.		Provision to sync, calibrate and stitch images captured through multiple cameras focusing on different parts of a single specimen.		
21.		Ability to perform incremental DIC calculations		
22.	Features of 3D-Digital Image Correlation Software	Output data file formats: .mat, .csv, .xlsx, ascii & .txt (Specify unsupported file formats)		
23.		Ability to assess the sharpness and lighting of the image and the size and contrast of speckles		
24.		User-interface should have the feature to select multiple points on the screen/image and get their individual strain evolution		
25.		Online Help files within the Graphical User Interface (GUI)		
26.		Auto-correlation options to select DIC parameters (subset, step size, strain window size, etc.) Specify the minimum and maximum range of DIC parameters and associated accuracy details		
27.		Other key features of the software algorithms that can be demonstrated before the purchase and should be specified.		
28.		Automatic recording of images in both Image Acquisition software and hardware on commencement		
29.	Features with Combination of All the Hardware and Software	Ability to provide a suitable pre-defined file name pattern like 'ABCDEF' (e.g., ABCDEF_1.XYZ, ABCDEF_3.XYZ, ABCDEF_3.XYZ, and so on.). Should be able to change the 'ABCDEF' to any other sample identification naming pattern.		
30.		Ability to measure a minimum of 15 microstrains for the given area of interest.		
31.		A desktop computer compatible with the hardware and software (List the key features of the computer)		
32.		Calibration tools/systems		

33.		Three software licenses to work on different computers and necessary USB dongles.		
34.		Facilitating the continued use of software through free additional licenses, USB dongles or other means, if an existing dongle and/or login credentials are lost accidentally.		
35.	**Number of quotations according to the features required** Provide separate quotations for 3D DIC systems with:	a)Two cameras and necessary accessories		
36.		b)Three cameras and necessary accessories		
37.		c)Two cameras 3D DIC set-up that can be integrated with the external mechanical testing machine such that displacement and strain data from DIC analysis is synchronized with the mechanical output data. (if this feature is available, not mandatory)		
38.		d)Three cameras 3D DIC set-up that can be integrated with the external mechanical testing machine such that displacement and strain data from DIC analysis is synchronized with the mechanical output data. (if this feature is available, not mandatory)		

Provide quotation for additional software licenses (in case of lost dongle, credentials etc.)				
	Warranty:	Minimum 2 years.		
		Optional Quote-1: Additional 2 years warranty may be quoted separately		
		Optional Quote-2: AMC beyond 2 Years Warranty period		
		(Optional quotes will not be taken up for price bid comparison)		

Sl.No.	Other Terms and Conditions	Complied/Not Complied	Reference Page No.
1.	The system should be delivered within 14-16 weeks from the opening of the letter of credit or issue of the purchase order, whichever is later.		
2.	Costs and related information should be given only in the financial bid.		
3.	The cost should include all delivery costs up to IIT Madras.		
4.	The warranty shall commence only from the date of equipment installation at IITM.		

5.	IIT Madras reserves the right to exclude some items from the purchase.		
6.	As part of tender technical evaluation,IIT Madras will approach the past end users for feedback and in case of any adverse feedback the bidder will be technically disqualified.		
7.	The system should be installed and commissioned with no additional cost.		
8.	Training at IIT Madras should be provided with no additional cost.		
9.	System manual should be provided in CD or pen drive form.		
10.	Services and spares should be necessarily available within India.		

Technical Bid should comprise of the following:

1	Detailed Technical brochure.		
2	Detailed technical write up explaining how each of the Technical Specifications are complied with, indicating the location in the brochure.		
3	The list of multiple Institutions/R&D units/Industry where similar installations have been supplied in India/abroad including contact details (name of the person in-charge, email, and phone number) is to be provided.		
4	The vendor should guarantee round the clock technical support not only during the warranty period but even beyond through an annual maintenance contract. Demonstration of having provided such satisfactory technical support to customers shall be enclosed with the technical bid		

(Note: It is mandatory for the bidders to provide the compliance statement in tabular column format along with catalogue page number (comply/not comply) for the Above points with document proof as required. Failing which bidders will be technically disqualified)