

## Technical Specification

### 3D Digital Image Correlation (DIC) System for full field shape displacement and strain:

<p><b>1. Strain master Eco 5M System, 1105452</b></p> <ul style="list-style-type: none"> <li>▪ For 3D strain and deformation analysis</li> <li>▪ 5 Mpx USB cameras – 02 No’s</li> <li>▪ 35mm C-mount lens – 02 No’s</li> <li>▪ Lightweight tripod – 01 No</li> <li>▪ LED bar light with blue cw illumination – 02 No,s</li> <li>▪ Compact designed PC with installed software</li> <li>▪ to synchronize cameras and light</li> <li>▪ Analysis of DIC raw data</li> </ul>	<b>01 Pcs</b>
<p><b>2. A/D Electronics for External Signals, 1108084</b></p> <p>Type ADC-250-USB, external device with USB connection, 250 kHz sampling rate, 8 channels, embedded in DaVis software Speckle Pattern Toolkit, 1103350 to apply fine speckle pattern on a sample, Includes special sponge, foam roller and, large stamp pad</p>	<b>01 Pcs</b>
<p><b>3. Speckle Pattern Toolkit, 1103350</b></p> <p>To apply fine speckle pattern on a sample, Includes special sponge, foam roller and, large stamp pad</p>	<b>01 Pcs</b>
<p><b>4. Fluorescence Paint For DIC, 1012056</b></p> <p>Orange fluid in a 150 ml bottle</p>	<b>01 Pcs</b>
<p><b>5. Camera Lens, 1013993</b></p> <p>25 mm F/2.0, M37.5 filter thread, c-mount, min. working distance 10 cm</p>	<b>02 Pcs</b>
<p><b>6. Set of Fluorescent Calibration Plates, 1107203</b></p> <p>consisting of 3 different validated single sided single plane (SSSP) calibration plates, black marks on orange fluorescent background, recommended for FOV approx. from 250 - 800 mm, QR-coded for automatic type-identification, The calibration plates are validated to quantify geometrical deviations from its technical specifications</p>	<b>01 Pcs</b>
<p><b>7. System Commissioning and Training</b></p> <p>detailed schedule for training to be discussed separately</p> <p>If an on-site visit at the time of installation is not possible due to general Covid-19 restrictions, we will offer alternative on-line or remote trainings.</p>	<b>01 day</b>

## **3D Digital Image Correlation System for Full Field Displacement and Strain Measurement**

### **Technical Specifications:**

1. Vendor needs to clearly specify item wise the local content manufactured in India for the 3D DIC System components and justify the same.
2. Images will be obtained in a CMOS USB Camera – Jpeg / Bitmap / Tiff.
3. Vendor must supply 2 Cameras and they must be of minimum 8 Megapixels CMOS Sensor with USB 3.0 Interface. CCD Cameras will not be acceptable.
4. Individual Hard Carry Case for Cameras and Calibration Grids.
5. Each Individual Camera must have the ability to capture minimum 40 frames per second.
6. Vendor must supply a heavy duty frame for camera stereo vision mounting. Tripods are not acceptable.
7. The Lenses for the Cameras must have a fixed focal length of 50 mm & 16 mm and must be from a reputed brand – Nikon/Zeiss/Computar/Rodagon/Basler. Other Brands will not be acceptable.
8. The Calibration grids must be rugged and made of Aluminum or any other metal and not of glass.
9. Two Individual LEDs must be provided with their own individual stands to mount the LEDs.
10. Software must measure 2D & 3D Co-ordinates – X, Y and Z Directions.
11. Software must measure 2D & 3D Displacements – X, Y and Z Directions.
12. Strain Fields – X, Y, Principal Strain, Shear Strain, Von-Mises and Tresca.
13. Subset, Step size and strain filter size must be user selectable.
14. Software must have Incremental Correlation Function.
15. Software must also indicate appropriate subset and step size automatically.
16. User friendly controlled image capture software for user defined cycle period for fatigue and creep studies.
17. Software must include Module for Video Presentations.
18. Image Capture software must have the provision to reduce the resolution of the camera in order to achieve higher frame rates.
19. Strain Tensor: - Lagrange, Engineering, Biot, Hencky and Euler Almansi.
20. Fill Boundary Option in Post Processing Analysis.
21. Rigid Body Motion Removal Function.
22. Provision for the user to create a new function from variables present after correlation.
23. Stress Computation built in the DIC Software.
24. Polar to Cylinder coordinate transformation feature.
25. Extract Data at a Point, Area or over a line.
26. Exporting the 3D Contours as an STL File.
27. Provision to calculate velocity.
28. Export of data – pixel grid data.
29. Time Average Data Function.
30. Creation of user defined variables.
31. Math Operations.

32. Export of Data to MATLAB.
33. Export of data to ABAQUS / ANSYS.
34. Calibration Grids of different sizes varying from 3 mm to 28 mm must be provided.
35. The licenses must be provided by vendor on a USB Dongle. Validity – Lifetime.
36. Vendor must install and provide training and use of system at IIT Patna.
37. Vendor must visit IIT and give a validation test of the system – this is the most important criteria for technical acceptance. DIC vs Strain Gage / LVDT / any other standard contact sensor. (Online demo is not acceptable)
38. Vendor must provide user list for the similar system supplied to centrally funded institutions – NIT/IIT/IISc/DRDO/CSIR Labs – atleast 5 systems in the past 5 years – this is very important for technical acceptance.

**List of items to be supplied:**

1. 2 x 8 MP Monochrome USB Cameras
2. 4 x 5m USB 3.0 Camera Cables
3. 2 x Camera heat sinks
4. 2 x Fine adjustment tripod heads (Ball heads will not be acceptable)
5. 2 x 16 mm C Mount lens
6. 2 x C-F Mount lens
7. 2 x 50 mm lens
8. 1 x Lens Cleaning kit
9. 1 x Foam padded case for cameras and lenses
10. 1 x Calibration Target Kit to cover a FOV of 10 mm to 1500 mm
11. 1 x Foam padded carry case for the calibration target kit.
12. 1 x Mounting stand with locking anti vibration wheels (tripods will not be accepted)
13. 1 x 4 Channel USB DAQ.
14. 1 x Laptop – Core intel i7 processor, 32GB RAM, 1TB SSD, Windows 10/11 with MS Office, 4GB Nvidia/AMD Graphics or better and other standard features and accessories.
15. 2 x High Intensity LED Lights.
16. 2 x Mounting stands for the Lights.
17. 1 x Installation and Training – 3 days at IIT Patna (online installation and training is not acceptable)