SOLUTION SHEET

TestDIC System

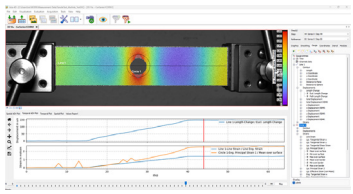
3-camera, fixed-setup DIC system for (quasi-)static and oscillatory (cyclic & fatigue) materials testing

TestDIC system used to measure the displacement and strain of a wooden sample with various holes sizes undergoing a 3-point bending test

Point, Shoot & Measure

The TestDIC is fixed-setup system, whereby the cameras are permanently mounted within the system unit and the (std.) lenses are supplied pre-adjusted (in both focus and aperture). The advantage of this setup approach is that no adjustment of the cameras and/or lenses is required for a given test. Additionally, the calibration of the projection does not need to be performed each time, before a new test setup is used – since the DIC test setup remains unchanged.

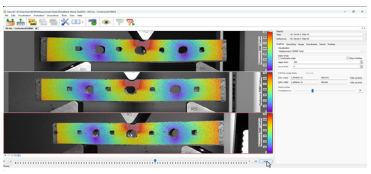
The TestDIC is available with either 5 or 12 Mpx cameras and is designed for measuring a Field-of-View (FoV) (H x V) of 25 x 20 cm or 42 x 30 cm, with the standard supplied lenses of f= 16 mm, respectively. Two laser pointers are incorporated in the TestDIC that aid the user in adjusting the correct Distance-to-Object (DtO), for which is set at 50 cms. At the point of intersection (cross-over) between the two laser pointers, the correct distance and point-of-focus has been set.



2D-overlay of principal strain for a tensile test

Key benefits

- Fixed-setup – no adjustment of cameras and/or lenses
- Integrated laser pointers for DtO adjustment
- High spatial & strain resolution
- Ease-of-Use (EoU) Focused, Software Workflow
- 3rd Camera Solution (CRCP) – 25% higher accuracy
- Real-time, in-situ DIC capability
- Application Module Plugins
- Advanced, Automated Triggering Protocol



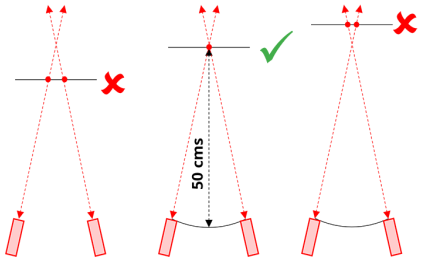
2D-overlay of total displacement with RBMR for a 3-point bending test

TestDIC system setup

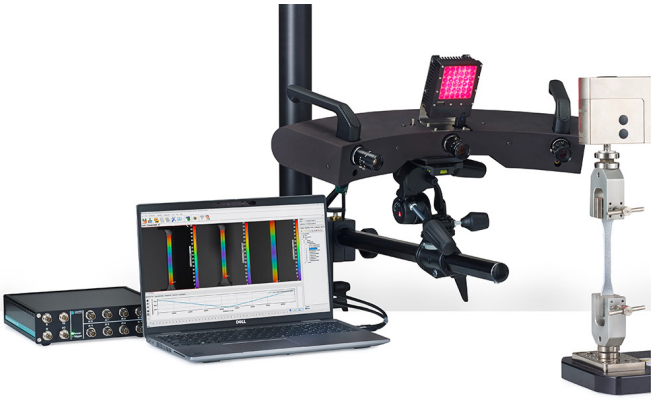
A DIC system catered for Industrial materials testing

The TestDIC is designed to be used in an industrial materials testing environment, whereby the system is permanently mounted on, or next to, a materials testing machine for;

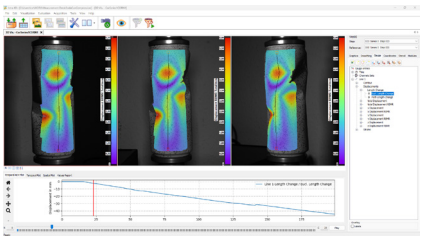
- All types of (quasi-) static testing, including; uniaxial tensile, compression, shear, bending, FLC, bulge, and biaxial tensile
- Oscillatory load (ie. cyclic, fatigue & fracture mechanic) testing
- Vibration analysis (<20 Hz excitation frequency)
- Motion analysis (<0.3 m/s test object speed)



Laser pointer schematic for various DtOs



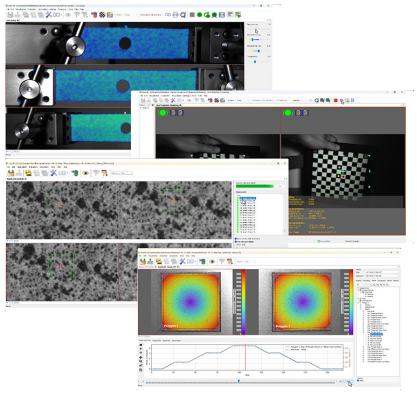
TestDIC system used to measure the deformation and strain of a poly-carbonate coupon sample undergoing a tensile test.



2D-overlay of total displacement with RBMR of a compression test

Ease-of-Use (EoU) Focused, Software Workflow

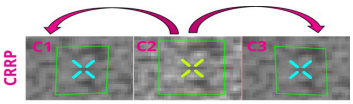
Istra4D is designed for ease-of-use (EoU), - for the user to do DIC and Point (Marker) Tracking. Now with the TestDIC - only requiring acquisition, evaluation, and visualization of measurement results. The software is structured, and the UI does not change. Complexity in options and settings is hidden. The process of getting measurement data is streamlined from start to finish. Configuring the hardware is straight-forward, acquiring data is simple, performing a projection calibration is (even) automated, correlating the data is a step-wise process (users can also copy/import correlation settings), and the graphical visualization is self-explanatory.



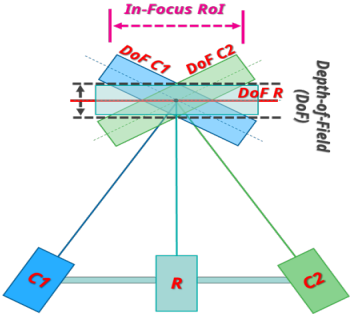
Workflow of Istra4D

The 3rd Camera Solution (CRCP)

When 3-cameras are used to measure a test object, a 3rd centrally aligned camera, perpendicular to the object surface, is selected to be the common reference for the two outer cameras. This approach is known as the Central Reference Camera Perspective (CRCP). Using the CRCP both the in-plane sharpness and out-of-plane depth-of-field (DoF) is maximized, compared to a 2-camera setup. The facets/subsets are defined on the centrally aligned, middle "reference" camera plane that is most perpendicular to the object surface. These are then projected onto the other camera imaging planes, naturally with the smallest perspective shape distortion (and error). The CRCP reduces perspective distortion of the facet/subset shape, and as such, improves measurement accuracy by 25%, compared to using a 2-camera setup. Test objects that are curved (cylindrical) or non-planar (with edges or corners with small radii) can be measured better using the CRCP with larger Fields-of-View (FoV) and higher accuracy. Additionally, the CRCP approach maximizes both in-plane sharpness and out-of-plane depth-of-field (DoF) compared to a 2-camera setup.

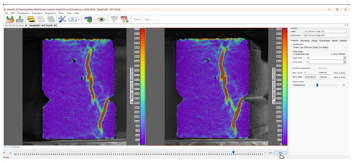


Example of facets/subsets in the CRCP



3-camera DIC setup using the Central Reference Camera Perspective (CRCP)

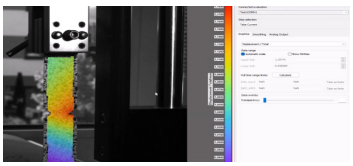
TestDIC system used to measure the deformation and strain of an aluminium coupon with a centric hole cutout undergoing a tensile test.



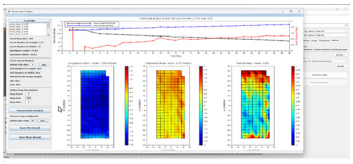
2D-overlay of effective strain for a compression test

Get results fast! – even in real-time

Real-time DIC is a function within Istra4D that allows users to perform Digital Image Correlation (DIC) whilst the cameras are operating in the online, live acquisition mode.
The live images are correlated, in-situ, using a maximum of three continuous-mode cameras. A 2D-overlay of any selected visualization is provided together with analogue outputs of up to two virtual gauge values. Images can also be acquired whilst operating in the real-time DIC mode aswell.



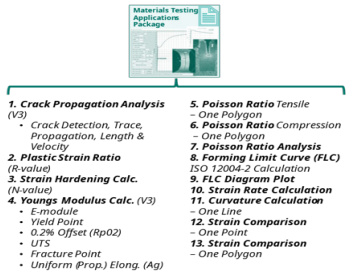
Real-time DIC



Poisson analysis module

Analyze data with application modules

Dantec Dynamics has free-of-charge, application modules that plug-in (and can be directly executed from) Istra4D. These modules are ready-made, scripts that are programmed in either; SciLab™ or Python™, and are installed automatically with Istra4D and also available via eLearning. For users, the application modules are ready-to-use. Each application module is fully explained and developed for a specific application purpose. Coded scripts can also be further modified by the user (no licensing conditions). Users do not have to invest time and effort in making custom scripts.



Technical specifications

TestDIC		
Number of Cameras	3	
Sensor, Frame Rate & Interface	5 Mpx (2448 x 2048 px) @ 77 Hz USB3 CMOS	12.3 Mpx (4096 x 3000 px) @ 30 Hz USB3 CMOS
Standard Lens Focal Length	16 mm	
Camera Setup Configuration	Fixed	
Standard Field-of-View (FoV)	250 mm (H) x 200 mm (V)	420 mm (H) x 300 mm (V)
Standard Distance-to-Object (DtO)	500 mm	
Measurement Performance		
Standard Spatial Resolution	102 µm/px	
Standard In-Plane Resolution	1 µm	
Standard Out-of-Plane Resolution	2 µm - 5 µm	
Strain Resolution	10 µstrain	

Ordering Information

TestDIC		
System	**DSM 85800: TestDIC System (5 Mpx)**	**DSM 85820: TestDIC System (12 Mpx)**
	1x TestDIC Rig incl. mounting, housing, 2x laser pointers 1x XR+ illumination unit with safety goggles 3x USB3 5 Mpx @ 77 Hz CMOS C-mount Cameras 3x C-Mount f=16mm Lens 1x 150 mm Calibration Target 1x Istra4D Software Package incl. Software Platform, Camera Acquisition, Real-Time & Adv. DAQ Triggering, 3D Correlation Evaluation & Point Tracking, and Graphical Visualization, Application Scripting Modules (free-of-charge) FEA Validation Tool (free-of-charge)	1x TestDIC Rig incl. mounting, housing, 2x laser pointers 1x XR+ illumination unit with safety goggles 3x USB3 12.3 Mpx @ 30 Hz CMOS C-mount Cameras 3x C-Mount f=16mm Lens 1x 300 mm Calibration Target 1x Istra4D Software Package incl. Software Platform, Camera Acquisition, Real-Time & Adv. DAQ Triggering, 3D Correlation Evaluation & Point Tracking and Graphical Visualization, Application Scripting Modules (free-of-charge) FEA Validation Tool (free-of-charge)
Optional		
Smaller FoV	3x DSM 19525: f=25mm Lenses 1x KL 50210: 100 mm Calibration Target	-
Larger FoV	3x DSM 19512: f=12mm Lenses 1x KL 50220: 200 mm Calibration Target	3x DSM 192120: f=12mm Lenses 1x KL 50240: 400 mm Calibration Target
Hardware	1x DSM 24200: Laptop PC & 1x DSM 24300: Dell Docking Station *OR* 1x DSM 24210: Tower PC 1A	
DAQ	1x DSM 25030: Data Acquisition Controller (DAQ) *OR* 1x DSM 25055: Advanced Data Acquisition Controller (DAQX)	
Mounting	1x DSM 60030: Standard Tripod *OR* 1x DSM 60110: Portable Heavy-Duty Tripod	
Illumination	1x DSM 47250: X-Illumination Controller (incl. 600W Power Supply)	
Lens Pol. Filter	3x DSM 50524: f=12/16/25mm	3x DSM 50538: f=16 mm (***Optional*** 3x DSM 20236: f=12mm)
Illum. Pol. Filter	DSM 47180: XR/XG-LED Polfilter	

DANTEC DYNAMICS Turn Measurements into Knowledge

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