



OMEGA DIC® SOFTWARE

DIC Vibration Analysis

SOFTWARE

- Quick set-up and measurement
- Wide range of engineering tools
- Vibration-optimized functions
- API and customizable scripts
- Modularity and features

HARDWARE

- Support of various camera types
- Support I/O devices
- Special devices for measurement

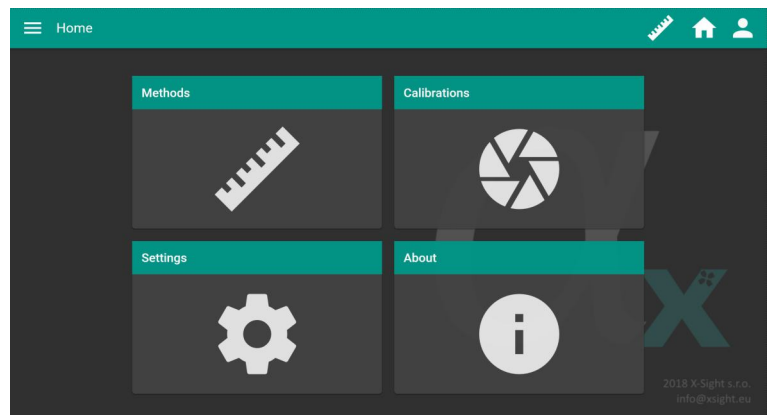
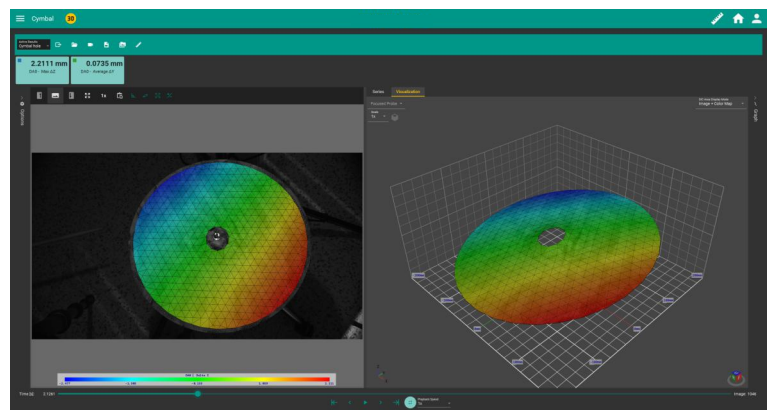
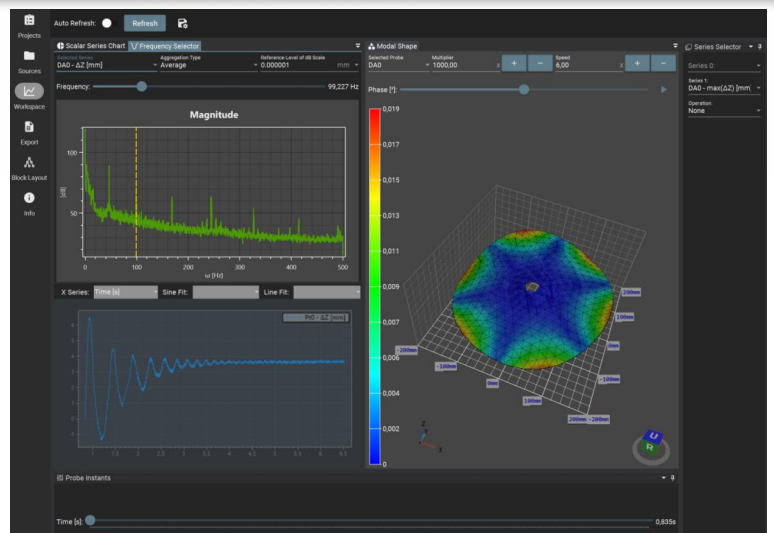
SERVICES

- New version twice a year
- Annual Technical Enhancements
- Customer Support
- Updates
- Subscriptions
- Academic licensing
- EDU Class licenses

SUPPORTED OPERATING SYSTEMS

- Win 11 64bit / Win 10 64bit
- Win Server 2019 / Win Server 2022

Latest Release on date of purchase



OVERVIEW

The X-Sight Omega DIC is an advanced image processing and data processing software solution developed to meet specific needs for vibration analysis across various engineering fields. Using advanced Digital Image Correlation (DIC) techniques and a range of data-processing tools, Omega DIC enables complex vibration analysis and evaluation of structural responses with unparalleled accuracy. It is ideally suited for measuring dynamic surface displacements, deflections and curvatures.

The software is an effective tool for engineers and professionals who need to perform structural health monitoring or machinery diagnostics.

DATA PROCESSING (PROJECTS)

The Data-processing functionality in the Omega DIC provides advanced tools for vibration analysis of processed measurement data. Preconfigured workflows support applications such as frequency-response evaluation and transient analysis. Key areas of focus include time domain operational deflection shapes (TODS), frequency domain operational deflection shapes (FODS) and Campbell diagram generation.

OPERATIONAL DEFLECTION SHAPES (ODS)

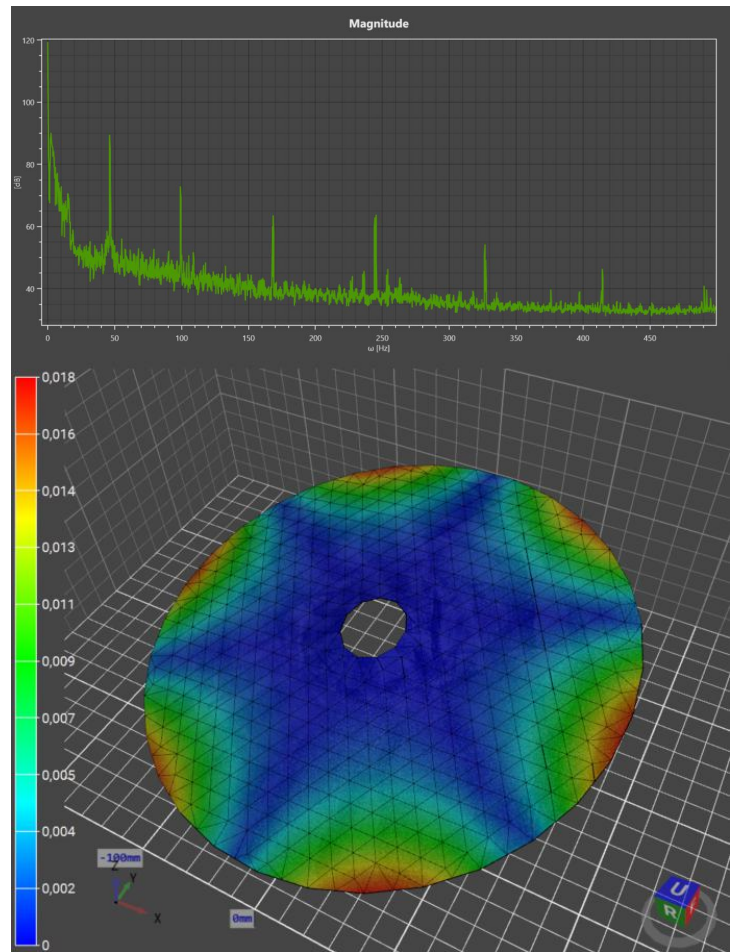
Operational Deflection Shapes (ODS) represent the deformation behaviour of a structure under operating conditions. Based on advanced full-field Digital Image Correlation (DIC) with a user-friendly graphical interface, the OMEGA DIC enables visualization of displacements and vibration patterns across the entire measured surface with unprecedented spatial resolution.

ODS analysis provides intuitive insight into structural dynamics, allowing engineers to identify critical areas of motion, detect resonant frequencies, and understand system behaviour under real operational conditions.

The functionality is implemented within the data-processing environment using configurable block layouts and standard signal processing tools, including time-domain evaluation and frequency analysis (FFT). Visualization is supported by animated deformation views and frequency-selection tools, enabling efficient interpretation of results.

FREQUENCY DOMAIN ODS (FODS)

FODS describe structural behaviour at a selected frequency. They are computed using frequency-domain transformation methods, such as the FFT, and provide the amplitude and phase distribution at each measured point. This allows isolation of dominant vibration components and clear visualization of frequency-specific behaviour. FODS is typically used for resonance identification, harmonic excitation analysis, and diagnostics of rotating machinery.



▲ X-Sight Omega DIC SW frequency selector and equivalent operational deflection shape.

TIME DOMAIN ODS (TODS)

TODS describe structural deformation as a function of time. They are derived from time signals such as displacement, velocity, or acceleration directly and capture the full dynamic response, including all frequency components. TODS enables frame-by-frame or animated visualization of motion and is particularly suitable for analysing transient events such as impacts, start-up or shutdown processes, as well as detecting non-linear behaviour and validating time-dependent system response.

METHODS

A Method defines the project structure for measurement presets, such as camera setup, calibration selection, measured data, and measurement tool settings and layout. It also includes all recorded or imported data. The method, including custom scripts, can be exported and transferred to another Omega DIC installation as a zip archive.

DYNAMIC RECORDER

The Dynamic Recorder is a specialized software tool for the XIMEA camera family, designed for capturing dynamic phenomena where real-time visualization is impractical. To enable higher recording frequencies, Omega DIC automatically disables measurement probes and saves the selected settings, significantly increasing the recording rate.

CALIBRATIONS

A mono (2D) or stereo (3D) calibration can be performed in different ways, and in all cases, it is necessary to create a camera model, which can be done using a calibration grid or a camera image. The camera model can then be used for other calibration types. Omega DIC is equipped with a library of camera models for optical components supplied by X-Sight to ease the calibration process.

Mono calibration can be performed by placing a calibration grid at a specified position within the test setup, or through manual calibration by adjusting the scale factor or perspective relations.

Stereo calibration offers high-precision calibration by detecting multiple positions of the calibration grid or by detecting matching points to define the camera pose using visible surface features.

The Calibration procedure supports single- or stereo-camera-pair mode. More cameras or camera pairs can be calibrated in joined mode, enabling image stitching based on overlap, or independently as two or more mono cameras or multiple stereo pairs, using calibration merging.

CAMERA SUPPORT

The X-Sight Omega DIC supports USB, 1/2.5/5/10GigE, FireWire, Camera Link, CoaXPress and PCIe cameras of the following brands: FLIR, BASLER, AVT, IDS, DAHENG, XIMEA, DYNACOLOR, ISPEED7, HIKROBOT.

Resolution of supported cameras ranges from 1 to 65 MPx at frame rates up to 10 kHz.

Data from high-speed and other cameras can be processed offline.

DATA TRANSFER

Multiple ways exist to **OUTPUT** the measured data to the machine control unit or the testing machine software.

- **Digital**
DOLI Binary, MODBUS, HP VIDEO, TCP/IP, RS232
- **API**
Alpha API (JSON), MRT API
- **Analog**
Auxiliary AD/DA converters

INPUT of external data to X-Sight Omega DIC (force, temperature, pressure, excitation frequency) is also possible (requires Device Input software module - DI).

The API communication allows for remote operation. This feature includes commands like START/STOP, Method Switch, Set Gauge Length, and others. For more info, check out the **Communication Options** document.

I/O DEVICES

The output devices enable the transmission of real-time data measurements to external DAQs and other measurement chain devices. Software supports the following brands and communication protocols:

- Advantech DAQ
- MCC DAQ
- Digital Output TCP/IP
- Digital Output COM
- Modbus
- LabView

The input devices allow recording of signal inputs of the following ways:

- Advantech DAQ
- MCC DAQ
- Digital Input TCP/IP
- Digital Input COM
- Modbus
- LabView

X-SIGHT DEVICE & ITEMS

There are specialized devices dedicated to DIC that help us use our systems with vibration and shock testing machines and in automatic lines.

USB Relay

USB Relay enables remote control of the light and other auxiliary devices and synchronizes their start with the measurement start.

Synchron

Synchron is an auxiliary device that enables phase-controlled triggering of cameras based on an external excitation signal, such as a shaker.

In ODS analysis, acquisition is allowed at a defined phase position of the excitation. Using stroboscopic mode, the full vibration cycle can be reconstructed even with low frame-rate cameras. The resulting visualization corresponds to Videostroboscopy.

This enables phase-resolved deformation analysis and supports Time Domain ODS, including higher-frequency measurements without the need for high-speed cameras.

Calibration Grids

The X-Sight OMEGA DIC SW utilizes circular dots calibration grids to ensure proper calibration. These calibration grids can either be regular, with all dots of equal size, or contain fiducial points. The default grids that come with the X-Sight system are made of aluminum and are 3 mm thick.

For small-scale applications, microgrids manufactured by photolithography are also available. These provide high precision for calibration of small measurement fields and are offered in grid sizes from 0.125 mm to 1 mm.

Speckle Pattern Kit

A set of stamps can be used to ease the application of a speckle pattern. This kit includes black-and-white pigment-based stamp paint.

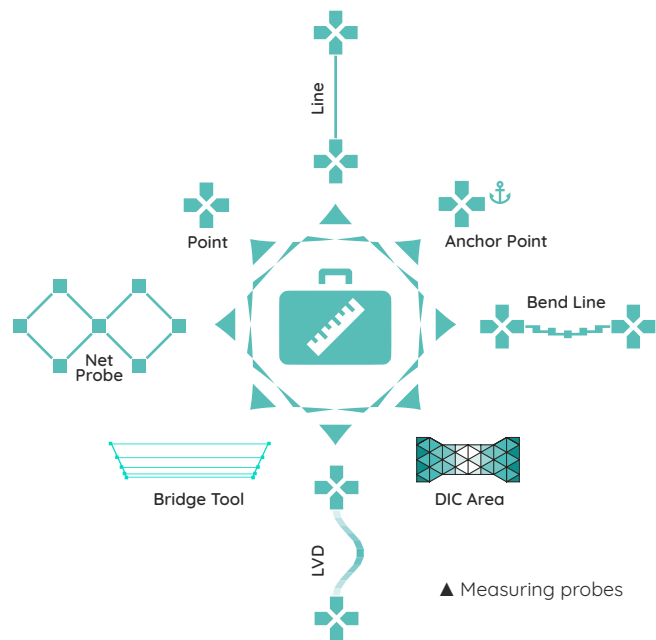
THE MODULARITY AND PROBES

The X-Sight Omega DIC software is split into several modules. Modules group different measuring probes or advanced features.

Omega DIC software licenses are delivered with the core **DEFLECTION** module for 2D measurement setups or **DEFLECTION 3D** for stereoscopic 3D setups, together with most software modules (BLD, DICD, NETD, PP, LVD, PS and VIBRO).

The only modules not included in the standard DIC configuration are DI (Device Input) and BT (Bridge Tool), which are available as **optional extensions**.

Note: **Strain computation is not supported.**



MEASURING PROBES



POINT PROBE is a basic measuring probe for displacement determination.



ANCHOR POINT allows the isolation of displacements of other probes from displacements of the Anchor Point. It is intended for use with other probes.



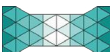
LINE enables dual-position angular-twist and displacement measurements.



BEND LINE is a probe designed to measure displacements and deflections along a curve, enabling real-time visualization of the deflection distribution.



LINE VALUE DISTRIBUTION provides a colourful strain visualization feature during real-time measurement.



DIC AREA is the full-field probe for mapping displacement distributions.



NET PROBE comprises an arbitrary number of nodes (points) and edges (lines), with each edge measured separately.



BRIDGE TOOL is a series of consecutive rectangles placed on repeating patterns of measured objects of known dimensions. Allows measuring deflection and sway.

SW Module	Point	Anchor	Line	Bend Line	Net Probe	DIC Area	Bridge tool
DEFLECTION/DEFLECTION 3D	•	•	•				
BLD				•			
NETD					•		
DICD						•	
PP	Post-processing of recorded measurements (different probes or layouts)						
LVD	Color value distribution along Bend Line						
PS	Point spectrum						
DR	Dynamic recorder functionality						
VIBRO	Vibroanalysis pack FODS, OMA FDD methods						
BT*							•
DI*	Possibility to input auxiliary signals (digital and analog)						

* Expansion software module available for Omega DIC

LICENSING

The X-Sight Omega DIC software license is bonded to an HW USB dongle. This allows the user to install the software on unlimited computers and use it only on the one where the license key is plugged in. This licensing method makes it easy to switch the computer in case of a PC breakdown.

The standard OMEGA DIC license is perpetual and includes one year of TECS.

The perpetual software license can optionally be extended with NET licenses for classes, schools, colleges, or universities, in batches of 20 annual licenses for EDU (educational) purposes.

The **EDU** licenses can be used only by elementary, secondary, and higher education schools (universities), educational institutions, and training centers and will be installed only on equipment owned or used by such entities.

The software will be used exclusively for educational and non-commercial purposes. This type of software license may not be used for grant-funded research purposes. The educational license may not be used for any profit-seeking activities.

The **ACADEMIC** license is a one-year subscription that can be used for non-commercial purposes only. The academic license may only be used to conduct research up to and including TRL (Technology Readiness Level) 5. If you wish to conduct research beyond TRL 5, you must purchase a commercial license.

LANGUAGES

The X-Sight Omega DIC software is globally competent, offering full localization in a variety of languages to cater to our diverse user base. Currently, our platform is fully operational in **English**, German (**Deutsch**), Czech (**Český**), Polish (**Polski**), Spanish (**Español**), Russian (**Русский**), Chinese (**中文**), and Japanese (**日本**).

ERROR POLICY

For the optimal functioning of the software, the installation of necessary updates is recommended. In case of error reporting, the necessary updates are released.

TECS

Technical Enhancements refer to major and minor enhancements, changes, improvements, and non-critical bug fixes to the software product made available through online updates. They include new features, bug fixes, security updates, performance software improvements, modifications, customer-based feedback changes, design and user interface updates, and improved performance. Technical Enhancements are released twice a year, as minor and major releases, to allow users to take advantage of new features and improved performance.

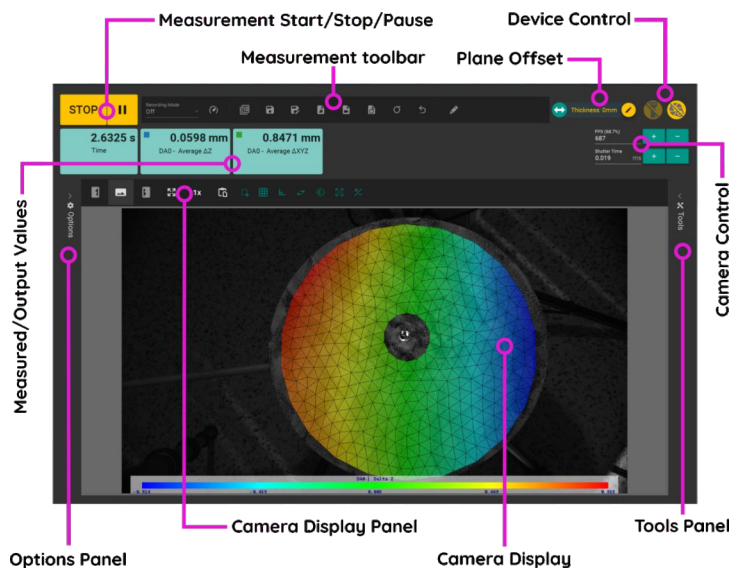
Customer Support ensures that customers acquire the right to guaranteed assistance in solving their technical problems related to the operation of the software and hardware. This includes remote consultations and solutions via telecommunication services or email.

Customer support is included in the price of TECS based on the product type, with expiration at the end of the valid period. The customer support service is available through the proposed teleconference services (TeamViewer, Windows Remote Assistance, AnyDesk, Skype, MS Teams, Zoom, Google Meet, etc.). The teleconference request should be sent to [tec@xsight.eu](mailto:tecs@xsight.eu) with "teleconference request" in the email subject.

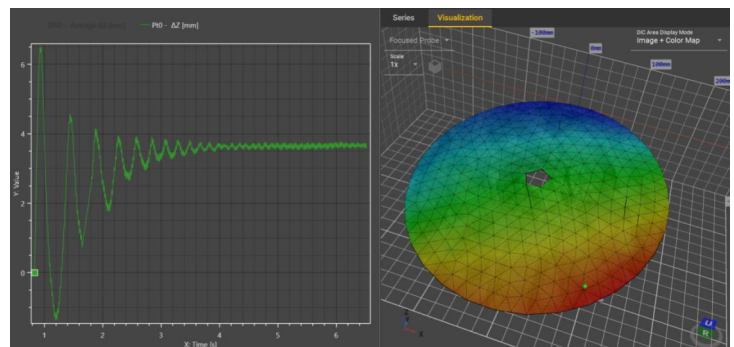
DATA ACQUISITION GUI

The GUI screen has multiple panels for real-time measurements control.

- Camera Display
- Camera Display Panel
- Camera Control
- Options Panel
- Tools Panel
- Measurement Start/Stop/Pause
- Measured/Output values
- Measurement toolbar
- Plane offset
- Device control
- 2D and 3D real-time chart



▲ X-Sight Omega DIC SW data-acquisition GUI



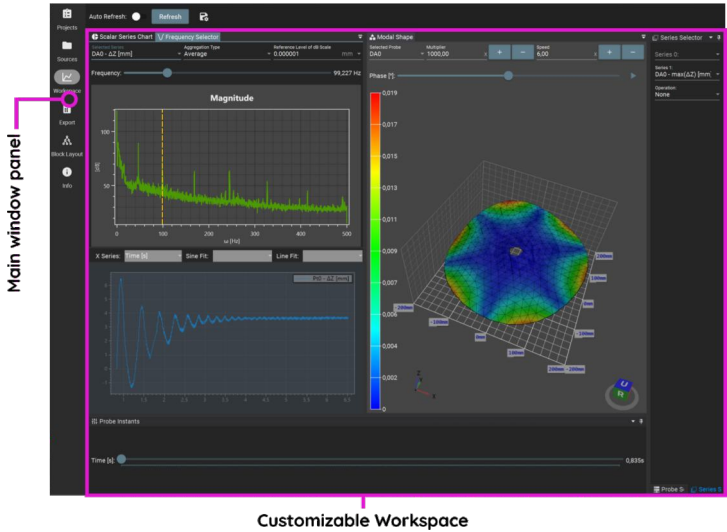
▲ X-Sight Omega DIC SW 2D and 3D real-time charts

DATA PROCESSING GUI

The data processing GUI is generated dynamically from connected function blocks and automatically adapts to the required analysis type, ensuring that only relevant functions and parameters are presented.

Main windows are:

- Overview of Projects
- Input data sources
- Workspace
- Block Layout
- Data Export



▲ X-Sight Omega DIC SW data-processing GUI – Workspace

SYSTEM REQUIREMENTS

System requirements	System requirements Recommended
CPU	Intel/AMD 4-core CPU (>4000 points - Average CPU Mark *) Intel/AMD 8-16-core high-frequency CPU (>25000 points - Single Thread Rating **)
GPU	NVIDIA/AMD/Intel OpenGL 3.0 compatible (>300 points ***) NVIDIA/AMD/Intel OpenGL 3.0 compatible (>5000 points ****)
Memory	32GB RAM 64-256GB DDR4/DDR5
Disk	50GB SSD free space 1TB NVMe SSD recommended
Operating System	Windows 11 64-bit ***** or Windows 10 64-bit ***** Windows Server 2019 ***** or Windows Server 2022 *****

* MID CPU BENCHMARK www.cpubenchmark.net

** HIGH-END CPU BENCHMARK www.cpubenchmark.net

*** MID-RANGE GPU BENCHMARK www.videocardbenchmark.net

**** HIGH-END GPU BENCHMARK www.videocardbenchmark.net

***** Latest Release on date of purchase

Recommended configurations depend on image resolution, number of cameras, acquisition duration and overall data throughput requirements.