# ALPHA DIC SOFTWARE
## Digital Image Correlation

### SOFTWARE

- Quick set-up and measurement
- Simple operator mode
- Real-time functionality
- Wide range of engineering tools
- Extensometer-optimized functions
- Natural pattern measurements
- API and customizable scripts
- Modularity and features

### HARDWARE

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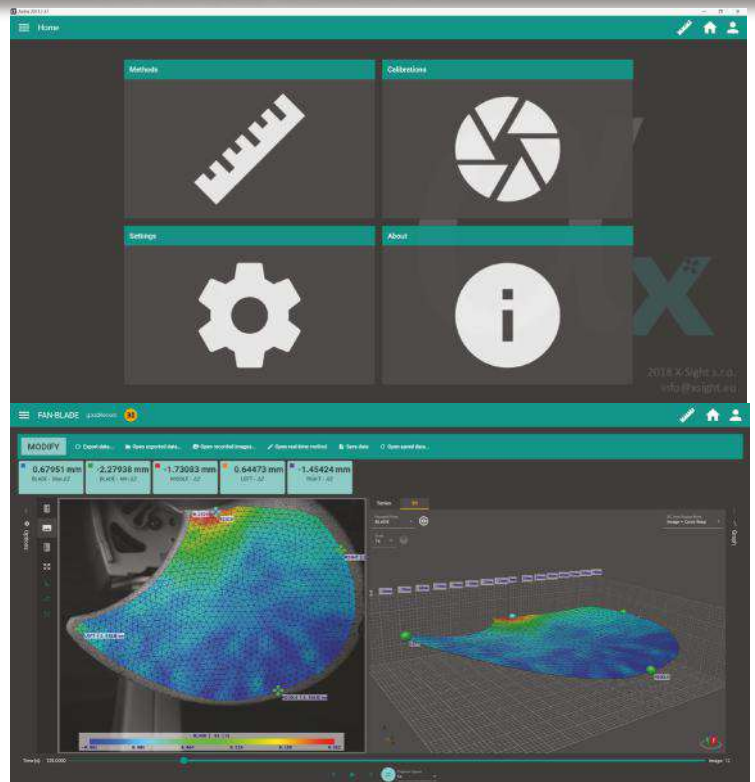- Support I/O devices
- Special devices for measurements

### SERVICES

- New version twice a year
- Annual Technical Enhancements
- Customer Support
- Updates
- Subscriptions
- Research 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 ALPHA DIC is image processing software that can be used in a variety of engineering applications to evaluate the deformation and deflection of a visible object captured by cameras, either online or offline. With ALPHA DIC software, you can perform complex analyses of deformations and obtain precise measurements of various parameters. Our cutting-edge Digital Image Correlation (DIC) techniques, combined with a range of engineering tools, enable you to accurately measure changes in surface strains, lengths, point motions, deflections, and curvatures. The software is the perfect tool for engineers and professionals who need to perform advanced structural analysis.

# OPERATION MODES

The X-Sight ALPHA DIC has two user modes, which differentiate skilled users performing advanced analyses from standard operators running repetitive measurements.

**Administrator mode**
All features, including calibrations and settings, are allowed.

**Operator mode**
Largely limits the rights of the user. This mode restrains any changes in settings or calibration. An operator can only select the measurement method preset and adjust the probe location, but not its settings, such as gauge length.

# METHODS

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

# CALIBRATIONS

A mono or stereo calibration can be performed in three different ways. The **full calibration** can be done using a calibration grid to create a camera model useful for other calibration types. ALPHA DIC is equipped with a library of camera models for optical components supplied by X-Sight to ease the calibration process. The **simple calibration** can use only the scale factor or perspective relations. It can be combined with a camera model to compensate for lens distortions. The **composite stereo calibration** simply defines the pose of cameras using visible surface features based on the chosen existing camera models.

The calibration procedure supports single or stereo camera pair mode. More cameras or camera pairs can be calibrated in the joined mode, making image stitching by certain overlap or independently as two or more mono cameras or multiple stereo pairs.

# CAMERA SUPPORT

The X-Sight ALPHA DIC supports USB, GigE, FireWire, and PCIe cameras from the following brands: FLIR, BASLER, AVT, IDS, DAHENG, and XIMEA. The supported camera resolutions range from 1 to 65 MPx, with frame rates up to 4.5 kHz for real-time data processing. The system supports the connection of an Optris IR camera for applications requiring temperature monitoring. High-speed cameras and other cameras can be processed offline based on recorded data.

# 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

- **PULSE**
  quadrature encoder-like pulse communication with the use of a PULSEGEN device

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

The API communication allows to operate remotely. 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 allow the sending of real-time data measurements to external DAQ and other measurement chain devices. Software supports the following brands and communication protocols:
- Advantech DAQ
- MCC DAQ
- HP Video
- DOLI Binary Protocol
- Digital Output TCP/IP
- Digital Output COM
- Mercury RT API
- Modbus
- LabView
- PulseGen (X-Sight)

The input devices allow recording of signal inputs of the following ways:
- Digital Input COM
- Digital Input TCP/IP
- Advantech DAQ
- MCC DAQ
- PIX Connect
- ZP-500N
- Modbus
- LabView

# X-SIGHT DEVICES & ITEMS

There are specialized devices dedicated to DIC and optical extensometers, which help us use our systems with testing machines, in automatic lines, and on vibration testing applications.

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

### PulseGen
PulseGen is an auxiliary device designed for X-Sight measuring systems interfacing testing machines. For a test rig, PulseGen acts as an incremental encoder working on a 5V logic. The signal type is a quadrature A/B. This device comes in dual or quad channel variant.
PulseGen supports external trigger to remotely start and stop the measurement in Alpha software. This trigger works on a 5V logic as well.

### Wireless sync
Providing the synchronization of multiple cameras for long distances from 0-100 m with accuracy < 2 microseconds up to hundreds of meters or 1 km depending on direct view factor with accuracy < 5 microseconds.

### Synchron
Synchron is a device that triggers cameras to capture images based on a predetermined scenario. This device allows the system to capture only the moments of highest or lowest load or record a complete cycle with more data points per cycle than a camera can provide.
Synchron is particularly useful for fatigue and crack-growth measurements.

### Calibration grids
The X-Sight DIC Alpha software 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 X-Sight systems are made of aluminum and are 3mm thick.
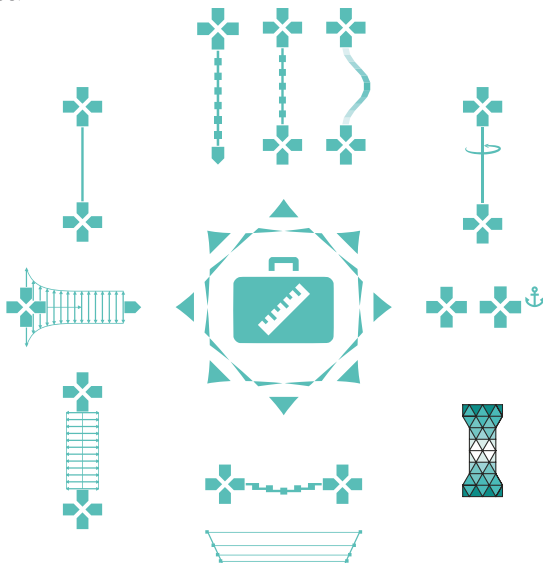
### Speckle pattern kit
A set of stamps can be used to ease the application of a speckle pattern.
This kit includes black and white pigment-based stamp paint.

# THE MODULARITY AND PROBES
The X-Sight DIC Alpha software is split into several modules. Modules group different measuring probes or advanced features.



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 strain measurement.

EXTREME LINE is the probe for axial neck detection. Provides improved E-modulus reading and eliminates invalid tests caused by failure outside the gauge length area.

TRANS LINE offers a multi-positional transversal measurement with averaged and max/min width functions.

TORSION LINE enables dual position angular twist and strain measurement.

BEND LINE is a probe designed for bending tests. Measures strain over a curved shape and enables the visualization of the real-time strain distribution.

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

CRACK PROBE measures crack length during static or dynamic tests.

DIC AREA is the full-field probe for strain and displacement distribution mapping.

ROD LINE is designed for rebar measurement, it compensates for the detachment of the oxide layer during testing. Includes the axial neck detection feature.

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

# X-SIGHT DIC APPROACH
The X-Sight DIC Alpha software license is typically delivered with all modules, excluding four optional modules. The configurations are the following:

### • DIC 2D LITE
All modules excluding 3D / 3DL / BM/DIC

- **DIC 3D LITE**

  All modules, excluding DIC AREA.

- **DIC 3D**

  All modules

X-Sight DIC is a top model of SW Alpha with all functionalities and no limitations.

## X-SIGHT OPTICAL EXTENSOMETER MODULARITY APPROACH

The modularity approach is applied primarily for optical extensometer use cases.

The measurements are primarily performed in real-time using line-based measuring probes with online data transfer to the testing machine or DAQ.

However, to get the most out of an optical strain measuring device, there is an option to add a post-processing feature. In post-processing, the number of line-based probes can be multiplied or switched for an area strain or displacement mapping function.

This approach allows the building of a simple and cost-effective extensometer and easily expands it by modules. If users need many different functions, it is more effective to use a DIC license instead of many modules.

| Software Module | Point | Line | Extreme Line | Trans Line | Bend Line | Torsion Line | Crack Probe | ROD Line | DIC Area |
|---|---|---|---|---|---|---|---|---|---|
| AX | • | • | • | | | | | | |
| TR* | | | | • | • | | | | |
| TO* | | | | | | • | | | |
| CR* | | | | | | | • | | |
| ITT* | | | | | | | | • | |
| DIC * | | | | | | | | | • |
| PP* | Post-processing of recorded measurements (different probes or layouts) | | | | | | | | |
| DI* | Possibility to input auxiliary signals (digital and analog) | | | | | | | | |
| LVD* | Color value distribution along Extreme, ROD, or Bend Line | | | | | | | | |
| BM | Allows measuring deflection and sway and their side visualizations | | | | | | | | |
| 3D* | Full stereoscopic functionality for DIC systems | | | | | | | | |
| 3DL* | Full stereoscopic functionality for line-based probes | | | | | | | | |

* Expansion software module requires the presence of AX.

## LICENSING

The X-Sight ALPHA DIC software license is bonded to a hardware USB dongle. This allows the user to install the software on an unlimited number of computers and use only the one where the license key is plugged in. This way of licensing makes it easy to switch computers in case of a PC breakdown. The **standard ALPHA DIC license** is perpetual and includes one year of TECS. The perpetual software license can be optionally extended by 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 an annual subscription that can be used for non-commercial purposes only.

The research 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 ALPHA 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 tecs@xsight.eu with "teleconference request" in the email subject.
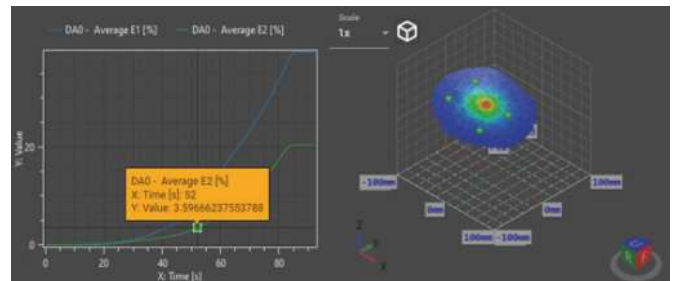
## MEASUREMENT GUI

The GUI screen has multiple panels for real-time measurement 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
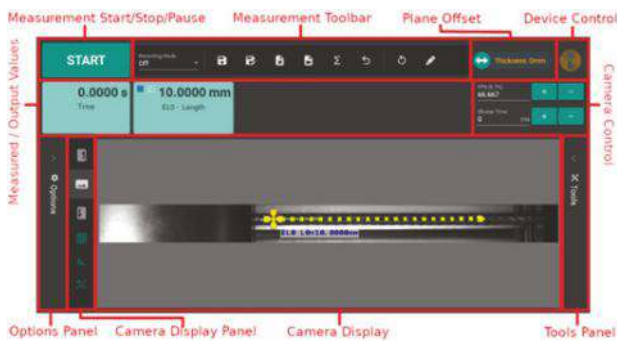


▲X-Sight ALPHA DIC SW measurement window



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

## SYSTEM REQUIREMENTS

| System Requirements | System Requirements \| Recommended |
|---|---|
| CPU | Intel/AMD 2GHz 2-core (>3000 points - Average CPU Mark *)<br>Intel/AMD 4GHz >8-core (>4000 points - Single Thread Rating **) |
| GPU | NVidia/AMD/Intel OpenGL 3.0 1024x768px (>300 points ***)<br>NVidia/AMD/Intel OpenGL 3.0 1920x1200px (>5000 points ****) |
| Memory | 4GB \| 16GB DDR4 |
| Disk | 8GB HDD free \| 1TB SSD / M.2 |
| Ports | 1xUSB (HW key), 1xUSB3.0 for each ONE device + 1xUSB2.0 (relay)<br>(Optional) 1xUSB for peripheral data transfer device<br>(Optional) 1xEthernet Port of MODBUS or TCP/IP communication |
| 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
\*\*\* MIDLOW GPU BENCHMARK www.videocardbenchmark.net

\*\*\*\* HIGH-END GPU BENCHMARK www.videocardbenchmark.net
\*\*\*\*\* Latest Release on date of purchase