



## MTS Advantage™ Video Extensometer (AVX)

Flexible, efficient and repeatable non-contact strain measurement

- » Load frame-mounted video extensometer
- » Magnetic-return support arm for precise and repeatable measurements
- » Quick-attach, pre-defined gage length measurement heads
- » Simple pass/fail ASTM and ISO calibration verification blocks
- » Software calibration verification wizards
- » Up to 0.05  $\mu\text{m}$  resolution

The Advantage™ Video Extensometer delivers confidence in non-contact strain measurement. The ergonomic design integrates a magnetic-return support arm for precise, repeatable video capture, and calibration verification procedures ensure continuous and traceable data accuracy.

Driven by powerful cameras, processors and software, the MTS Advantage Video Extensometer (AVX) delivers unprecedented speed, accuracy and flexibility for non-contact measurement. The extensometer recognizes patterns on the specimen to acquire measurement data, which is then processed by MTS TestSuite™ TW software to calculate specimen strain and modulus.

Choose from 16 different quick-attach, interchangeable measurement heads that have predefined gage lengths. Simply select a gage length and strain range that meets your testing needs, and use the corresponding materials testing measurement head to accurately determine Young's modulus, Poisson's ratio, or select R-Value; or a general purpose measurement head to measure high elongation materials.

The AVX's magnetic-return support arm swings out of the way for access to the specimen when using a chamber or test area enclosure. Also, the video extensometer can easily be mounted to any mechanical test system, and the LED light is integrated into the measurement head.

## Advantages of Video Extensometry

Because they do not touch the specimen, non-contact extensometers work well when specimens are thin or brittle, have irregular surfaces, require high-temperature or submerged environments or tend to release a great deal of energy at failure.

### **BUILT IN FLEXIBILITY**

Interchangeable measurement heads can replace dozens of extensometers in your laboratory. Buy multiple measurement heads with your initial purchase or add them as laboratory needs change.

### **PERFECT FOR DELICATE SPECIMEN SAMPLES**

When testing a specimen sample that is fragile, brittle or irregularly shaped, non-contact extensometry prevents damage caused by the contact forces of a clip-on extensometer.

### **TAKE MULTIPLE MEASUREMENTS**

Unlike other strain measurement technologies, the AVX allows users to take up to 200 measurements in real time with one instrument. Options allow users to upgrade to a more advanced package to measure strain, Poisson's ratio, rotation or shear strain.

### **TEST ONCE, MEASURE OVER AND OVER AGAIN**

The AVX reduces the chance for operator error in placing the extensometer on the specimen, and allows repeatable measurements to be taken after the physical test is complete in post process mode.

## Put the MTS Advantage Video Extensometer to Work for You

The AVX allows for non-contact multi-point measurement of strain, rotation, and displacement by using pattern recognition and sub-pixel interpolation to measure exact displacements of selected points on a video image.

### **TENSILE TESTING**

From testing nanowires to high elongation plastics, you can configure your AVX to test virtually any gage length with the correct measurement head. Additionally, AVX avoids common tensile testing problems like slipping, adding stress concentrations or breaking during high-energy fractures.

### **COMPRESSION TESTING**

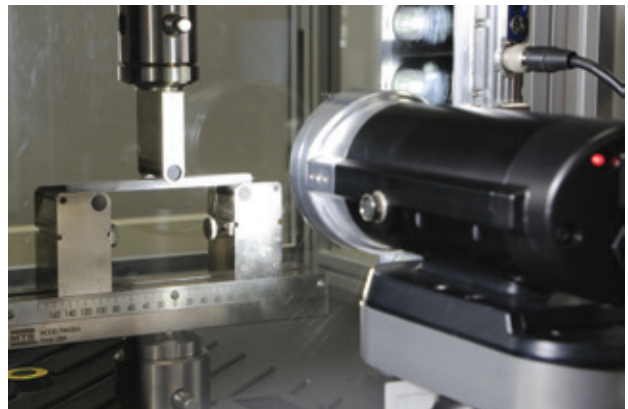
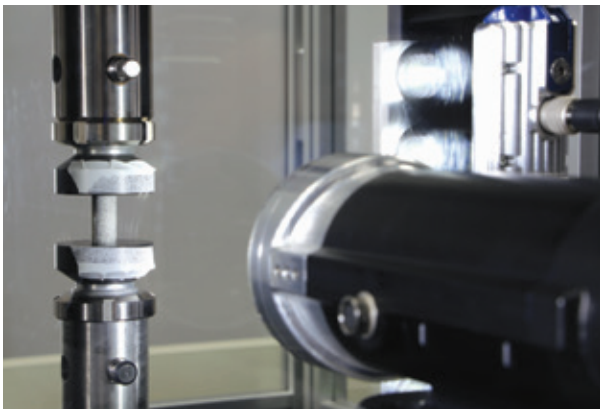
Compression platens often inhibit access to the specimen, but unlike contacting methods the AVX only requires line of site through to the specimen. Without specimen contact, there is little risk of damage to the strain measurement device.

### **MULTI-POINT BEND TESTING**

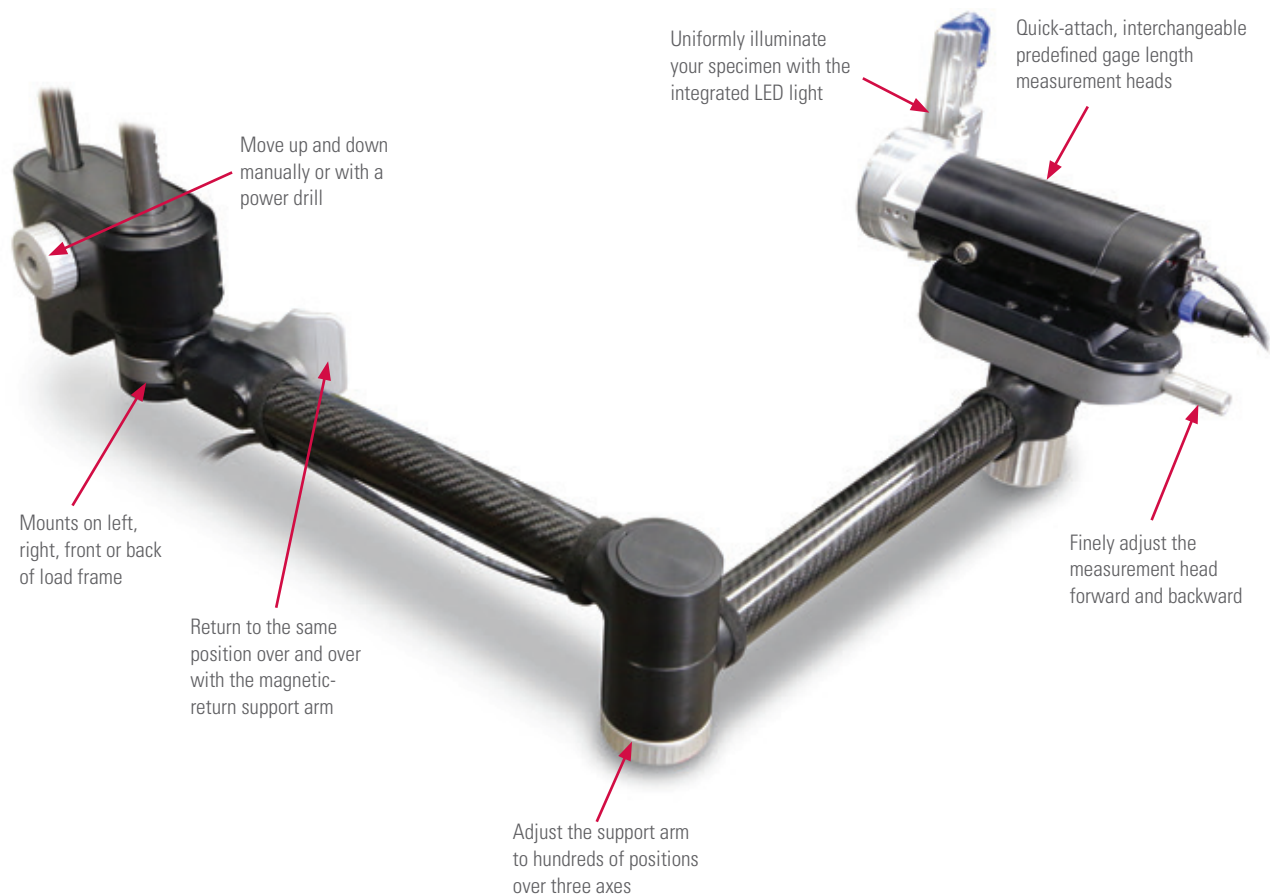
High-precision deflection measurements may be taken during a multi-point bend test. Point deflection measurements may be taken for the rollers or specimen, or strain can be directly measured from the surface in tension.

### **SHEAR TESTING**

2D multi-point tracking allows for direct measurements of shear strain. Direct measurements can be taken through measuring the change in angle between three points. Shear modulus measurements can be taken using these methods for v-notch or short beam specimens of any size using the appropriate hardware and minimal specimen preparation.



## MTS Advantage Video Extensometer



## Confidence and Flexibility in One Package

### MATERIALS TESTING MEASUREMENT HEADS

Specially designed optics in the XT-200 series or materials testing measurement heads enable the determination of materials properties at low strains (from 0.01%), such as Young's modulus, Poisson's ratio, and R-value. Choose from nine measurement heads with data collection rates of either 0.1 to 30 Hz or 0.1 to 500 Hz.



### GENERAL PURPOSE MEASUREMENT HEADS

More conventional optics offer excellent results when measuring strains greater than 10%. Choose from seven measurement heads capable of measuring high elongation materials.



### TEST AT HIGH AND LOW TEMPERATURES

High-temperature testing may be performed as long as the unit has a line of site through the chamber window. Magnetic-return support arm easily moves out of the way for easy specimen access.



## Maximize Efficiency with Easy-to-use Software

AVX software combines the control, capture, processing, and analysis of ultra-high resolution measurements into an intuitive user interface. After half a day's training, any user will feel confident that they are obtaining accurate results. Built on top of patented sub-pixel pattern recognition technology, the AVX software can measure almost any material, anywhere, using the most robust pattern tracking algorithms available.

### **DRAG AND DROP MEASUREMENT TOOLBOX**

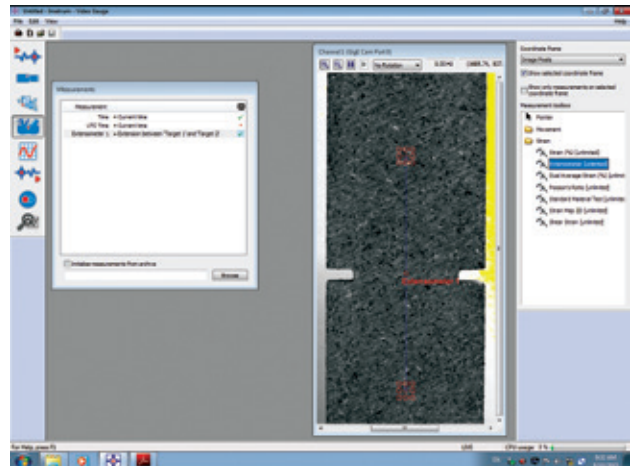
Drag and drop a full selection of virtual measurement devices onto your specimen. Pre-configured devices are equivalent to traditional devices, but without the hardware cost or headaches. Position a strain gage on your specimen in seconds, and save hours in specimen preparation.

### **MOVEMENT AND STRAIN TOOLS AT YOUR FINGERTIPS**

Select from 10 different virtual measurement devices in our advanced software to easily measure position, displacement, distance, or rotation. Virtual strain measurement devices convert motion into axial strain, dual average strain, Poisson's ratio, shear strain and 2D strain maps.

### **UNDERSTAND RESULTS QUICKLY WITH INTUITIVE GRAPHICAL DATA DISPLAYS**

MTS TestSuite TW software and AVX software create easy to interpret charts and graphs. Ethernet communication between systems sends  $\pm 10$  V signals to the MTS TestSuite TW software.



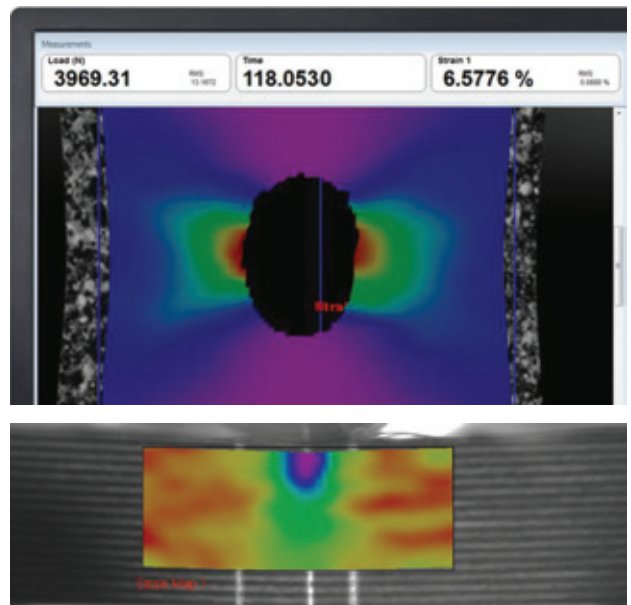
## Upgrade to Include 2D Digital Image Correlation (DIC)

The AVX packages include an option of adding DIC capability to create planar strain maps with real-time measurements. This convenient visual tool for scanning an area under load helps to identify areas of high stress, crack opening or other discontinuities.

The DIC option creates high-resolution, full-field maps that are overlaid on the original video files. Results are easy to interpret and it is possible to toggle between all measurement options without reprocessing a test.

### **EASILY VISUALIZE STRAIN AND DISPLACEMENT GRADIENTS**

The DIC software outputs 2D contour plots where color gradients show levels of strain. The software allows the user to define the x-axis and show E<sub>xx</sub>, E<sub>yy</sub> or E<sub>xy</sub>.

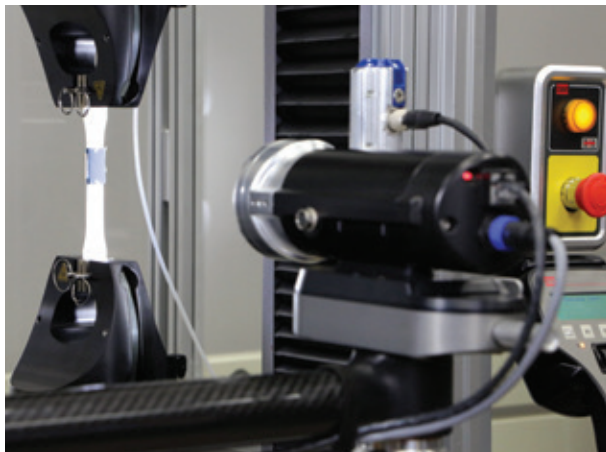




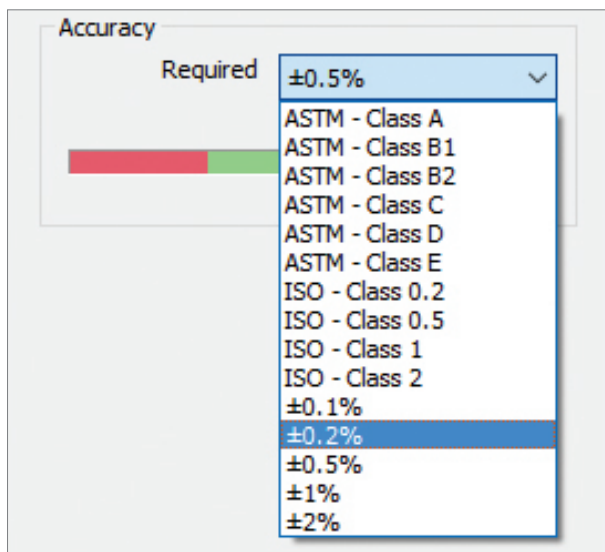
## Confidence in Your Test Data

Confirm that your set-up meets your ASTM E83 or ISO 9513 calibration with a pass/fail calibration wizard following these simple steps:

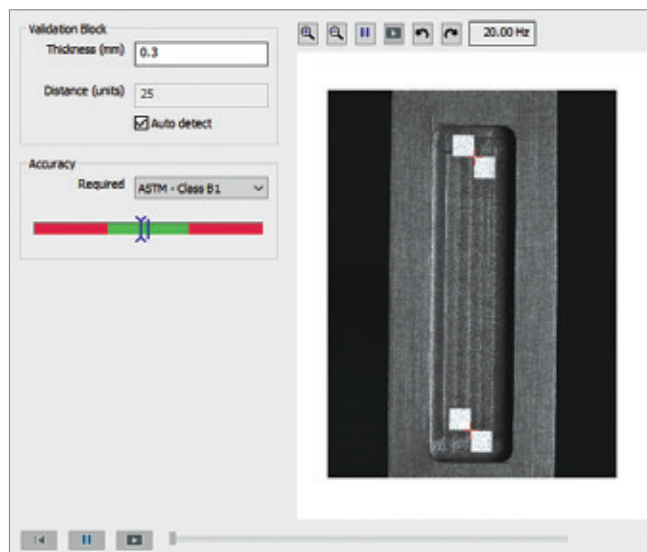
1) Place your verification block in front of your specimen



2) Select your desired ASTM E83 or ISO 9513 class from a drop down menu



3) Move the measurement head until blue cursor lands within green bar



4) Lock the support arm in place



Each AVX Measurement Head includes an inspected, traceable validation block, which can be used to confirm calibration at the beginning a series of tests. Validation blocks are serialized and include an ISO 17025 Accreditation Calibration Report.

## Powerful Controllers with Integrated Software

Portable, powerful, and compact AVX controllers move between test systems with ease. Each controller includes pre-installed software, solid state memory drives with ample data storage, and Ethernet connectivity to the system controller.

### Choose One of Three Software Packages

#### BASIC PACKAGE

Ideal for quality acceptance and quality control applications where measurements are simple and well defined.

#### ROUTINE PACKAGE

Works well for users that need more flexibility in measurements. Includes drag-and-drop preconfigured measurement tools including virtual displacement gages, extensometers and strain gages.

#### ADVANCED PACKAGE

Designed for the test lab that requires the flexibility to measure practically any physical displacement. Provided with unlimited drag-and-drop virtual measurements and the capability to measure up to 200 points in real time.



		Basic	Routine	Advanced
General Features	Live Mode	√	√	√
	Archive Recordings	√	√	√
	Post-Processing			√
	Review Mode	√	√	√
	Number of Video Channels	2	2	8
Measurement Counts (maximum no. √ = infinity)	Time	1	1	1
	UTC Time	√	√	√
	Position			2
	Distance			2
	Displacement	2	2	√
	Extensometer	2	2	√
	Strain Gage		1	√
	Dual Average Strain		1	√
	Standard Material Test			√
	Rotation		1	√
	Shear Strain		2	√
	Calibration Verification Wizard	√	√	√
	2D DIC1	Optional	Optional	Optional

### Mounts to MTS Criterion® and MTS Exceed® Test Systems

Mounting brackets are available for all MTS Criterion and MTS Exceed test systems. Legacy, electrodynamic, servohydraulic and competitive mounting options are available upon request.



## Measurement Head Specifications

Each AVX Measurement Head includes an inspected, traceable validation block, which can be used to confirm calibration at the beginning a series of tests. Validation blocks are serialized and include an ISO 17025 Accreditation Calibration Report.

### XT-100 Series Measurement Heads

Ideal for determining higher strain (>10%) materials properties such as yield point & elongation, and for long gage lengths. All models are capable of meeting Class B-2 (ASTM E-83) & Class 0.5 (ISO 9513) at the specified gage lengths and strain ranges (>10%). They are also capable of meeting Class B-1 (ASTM E-83) over most of their operating range (gage lengths where maximum axial tensile strain less than 600%).

The XT-100 series operate at measurement rates from 0.1 - 500 Hz.



AVX Measurement Head	Maximum Axial Tensile Strain Range (%) at Specified Gage Length (mm) <sup>1</sup>					Maximum Axial Compressive Strain Range (%) at Specified Gage Length (mm) <sup>1</sup>					Maximum Transverse Gage Length (mm) <sup>2</sup>	Typical Extension Resolution (μm) <sup>3</sup>	Minimum Specimen Width for Measurements (mm) <sup>4</sup>		Maximum Tracking Speed (mm/min) <sup>2</sup>	Field of View (mm)
	10	25	50	100	200	10	25	50	100	200			Axial	Transverse		
XT-101	280	70	-	-	-	40	40	-	-	-	10	0.3	1.5	4	1350	57 x 16
XT-102	530	170	50	-	-	40	40	40	-	-	19	0.4	2.4	7	2100	98 x 27
XT-103	840	300	120	25	-	-	40	40	40	-	29	0.6	3.4	10	3200	150 x 42
XT-104	1000	460	200	65	-	-	40	40	40	-	43	0.9	5	14	4600	220 x 62
XT-105	-	800	360	150	40	-	-	40	40	40	70	1.4	8	23	7200	350 x 100

1. Strain ranges assume a distance between the grips of twice the GL, with a centrally positioned gage. Actual strain ranges may be greater or less than these values, depending on gage positioning, grip separation and specimen behavior.

2. Maximum transverse GL and tracking speed is quoted at a measurement rate of 100 Hz.

3. Resolution is based on typical lab performance.

4. For Class B-1, minimum specimen width for transverse gage lengths should be increased by 65%.

Note: Working distance is 480 mm.

### XT-200 Series Measurement Heads

Ideal for determining low strain materials properties (from 0.01%), such as tensile & compressive modulus, Poisson's ratio & R-value. All models are capable of meeting Class B-1 (ASTM E-83) & Class 0.5 (ISO 9513) at the specified gage lengths and strain ranges.

The XT-200 series are our highest accuracy measurement heads. These models operate at measurement rates from 0.1 - 30 Hz.

The XT-250 series are suitable for many high accuracy dynamic applications, and operate at measurement rates from 0.1 - 500 Hz.



AVX Measurement Head	Maximum Axial Tensile Strain Range (%) at Specified Gage Length (mm) <sup>1</sup>			Maximum Axial Compressive Strain Range (%) at Specified Gage Length (mm) <sup>1</sup>			Maximum Transverse Gage Length (mm) <sup>2</sup>	Typical Extension Resolution (μm) <sup>3</sup>	Minimum Specimen Width for Measurements (mm)		Maximum Tracking Speed (mm/min) <sup>2</sup>	Field of View (mm)
	10	25	50	10	25	50			Axial	Transverse		
XT-204	300	80	10	40	40	25	45	0.18	1.0	4.6	250	61 x 51
XT-205	460	145	40	40	40	40	63	0.25	1.4	6.4	350	86 x 72
XT-254	390	120	25	40	40	40	15	0.3	1.7	8	1900	76 x 21
XT-255	580	190	65	40	40	40	21	0.4	2.4	11	2600	107 x 30

1. Specified strain ranges assume a distance between the grips of twice the GL, with a centrally positioned gage. Actual strain ranges may be greater or less than these values, depending on gage positioning, grip separation and specimen behavior.

2. Maximum transverse GL and tracking speed is quoted at a measurement rate of 15Hz (XT-20x series) and 100 Hz (XT-25x series).

3. Resolution based on typical lab performance.

Note: Working distance is 273 mm and is subject to +/- 5% tolerance.



**MTS Systems Corporation**

14000 Technology Drive  
Eden Prairie, MN 55344-2290 USA

Telephone: 1.952.937.4000  
Toll Free: 1.800.328.2255

E-mail: [info@mts.com](mailto:info@mts.com)  
[www.mts.com](http://www.mts.com)

ISO 9001 Certified QMS

MTS, MTS Criterion and Exceed are registered trademarks, and Advantage and MTS TestSuite are trademarks of MTS Systems Corporation within the United States. These trademarks may be protected in other countries. RTM No. 211177.

© 2024 MTS Systems Corporation  
100-248-318g AdvantageVideoAVX • Printed in U.S.A. • 11/24