Modern Extensometry for a Data-driven World

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Although there are several versions of both contact and non-contacting extensometers in material testing — most of which are deemed cost prohibitive, extremely complicated to integrate or that lack the needed repeatability — extensometry has not changed all that much since it's standardization in the 1950s.

At its core, an extensometer is a very sophisticated ruler that can measure separation, displacement or compression of material, measuring down to half of a micron, and is used to measure displacement or strain on the surface of a test piece.

The performance capabilities of the VectorExtensometer practically renders traditional, mechanical tools obsolete

But if you work in material testing, chances are pretty high that you're working with an extensometer. And this critical testing utility needed a way to keep pace with modern testing environments.

There's been a perceptible paradigm shift behind the tried-and-true extensometer. With modern computing mechanisms built into this critical type of material testing machine, the result is extensometer technology that is now capable of replacing multiple contacting and non-contacting sensors with a single, industry specific instrument.

Bending the Curve

The self-contained VectorExtensometer integrates adaptive artificial intelligence (AI) capabilities with optical hardware to reduce test throughput time and complexity. It assists in the process of capturing strain data for better accuracy and improves measurement accuracy, data consistency and operator safety.

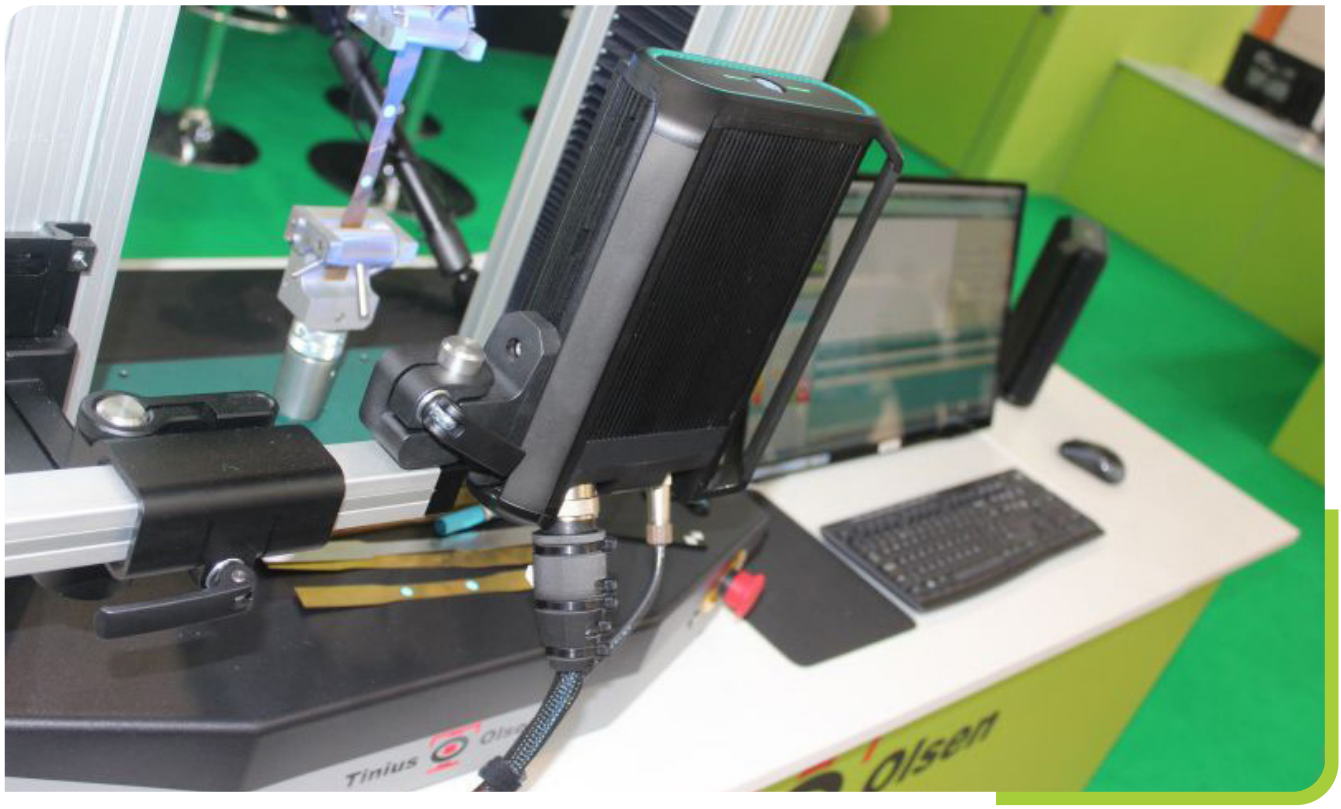
With the incorporation of newer processing technologies that better harness test data, combined with advanced pattern recognition and tracking algorithms, Vector was developed as the next generation strain measurement tool. It is enabling the advancement of a digital, data-driven material test process across a wide range of sectors within the entire industry. Yet, even with this new level of technological innovation, it has the capability to meet or exceed ISO 9513 Class 0.5 and ASTM E83 Class B1 standards.

Simply Advanced Material Testing

Specifically, Vector uses intelligent non-contact, high-accuracy measurement techniques to eliminate the common disadvantages of traditional contacting and non-contacting extensometers, while providing 0.5 µm resolution (1.9685039e-5 inch). It is a cost-effective, precision system that you simply plug in and power up, then increase testing efficiency in several ways.

The system reduces the amount of operator intervention, cutting down on manual errors in calculation or calibration and can simultaneously measure longitudinally and transverse. From highly fragile specimens to measuring strain through failure, Vector remains consistent in its testing performance, even in harsh applications and in challenging lighting conditions.

Vector has redefined the future of strain and displacement measurement in tension, flex and compression, and more. Its underlying technology has turned the testing machine zone into a digital representation, where a test event can be fully monitored and measured across large and smaller as well as non-uniform specimens.



Innovation that Matters

The VectorExtensometer offers a volumetric field of view that eliminates out-of-plane movement and is very tolerant of positioning relevant to the test specimen. It is stereoscopic, so distance to the target sample is no longer an issue. Additionally, success in test rates improve through the elimination of contact-point slippage and a lack of stress concentrations, such as damage from knife-edge contact.

Composites are analyzed using embedded artificial intelligence (AI) and machine learning algorithms that process volumes of data quickly and efficiently. The advanced graphical user interface (GUI) enables intuitive onboard or offboard post-processing of test data. For ease of data processing, video and test data is stored automatically and a live video feed allows user-specific test configuration and operation.

Most notable of all, the VectorExtensometer provides optimal ROI not just in its initial cost, but thanks to the streamlined testing process, the accurate results in every test scenario and the elimination of consumable parts that need replacement.

These innovations are a welcome uptick in the world of material testing, taking the best of modern technologies and wrapping them into an easy-to-use, price-competitive, feature-rich platform.

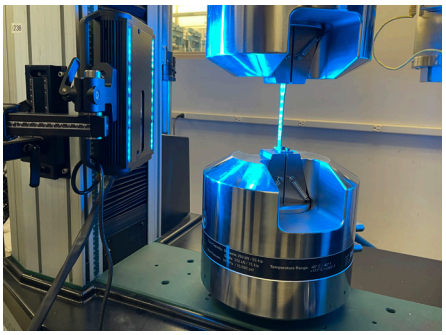
The Revolution in Extensometry

Attribute	Trouble Spot	The Vector Solution
Physical attachment	Poor Grip	Non-contact
Knife edges	Worn edges	Laser-enabled
Percent travel	Improper length	Compliant to ASTM E83
Gauge length	Manual calculation	Computerized measurement
Accuracy	Improper data collection	AI-based data capture

Quality Results in Every Test

Accuracy, resolution, data rates, control, precise adherence to test standards, calibration, measurement of uncertainty and traceability...all are essential parameters in extensometry and require precision testing operations.

Slippage, a common source of errors in material testing, can be caused by a number of sources in set up as well as during operation. Poor adjustments, improper clamping, loose springs and worn edges can all result in an indeterminate stress-strain curve, inaccurate measurement and invalid test results.



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Using lasers, Vector integrates a very quick, concise alignment process that enables a finite view of the sample being captured in the volumetric window. Vector can perform tension tests, compressive tests, bending tests, hardness tests, toughness tests, fatigue tests, and capture data without introducing any stress on the product. It also eliminates other common errors associated with traditional extensometry techniques.

Breakage under test due to elongation is another area of extensometry that adds complexity to repeatable, reliable material testing. The Vector system is capable of conducting elongation at failure to measure strain and complete testing without having to worry about the violent fracture that happens with tensile testing using a contact extensometer. This eliminates the introduction of stress concentrations onto the sample, so having to recalibrate or repair an extensometer after it was left on to failure is no longer an issue.

Modern Methodology for Extensometry

Using a zero-touch testing approach, the VectorExtensometer combines a large working volume (H200mm x D100mm x W75mm, fully 3D) and autodetection with output-calibration and continuous tracking to immediately set up each new specimen as it is installed.

Critical elements include the autodetection of the gauge markers to optimize tracking, while the intuitive laser alignment facilitates rapid setup and test cycles. The compact, versatile and robust universal test machine (UTM) mounting system provides flexibility for installation in virtually all mounting environments on any test system.

Vector enables automatic switching between scanning, measuring and validation modes and provides a clear status indicator light with a matching graphical interface for immediate feedback.

Keeping Pace with the Times

Budgets are tight and timelines are shorter. The pressure to deliver high-caliber products has never been greater. In a world where quality and reliability can make or break a reputation, cost-effective testing techniques that improve testing efficiency and capitalize on modern technological improvements are the ones that will give R&D, engineers and test facilities a distinct advantage.

By integrating adaptive AI capabilities with optical hardware, Vector reduces test throughput times and complexity, automating the process of capturing strain, improving measurement accuracy, data consistency and operator safety.

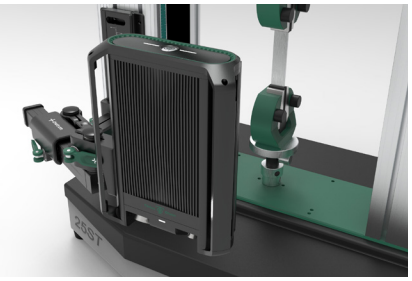
And if a material needs to be tested, chances are you need an extensometer. Not only does this new platform test all different types of material, from composites, plastic and polymers to construction materials, such as cement and asphalt, it provides simple, out-of-the-box functionality and reduces costs in set up, labor, test time and capital investment.

The mechanics of the Vector system, such as automated gauge mark placement as well as analog and digital data streams, make operation efficient, with fast, accurate and repeatable results. And because it integrates the functionality of several pieces of test equipment into one, single unit, it provides powerful materials testing in a compact footprint that can be installed in virtually any material testing environment.

Next Steps in Extensometry Advancement

There's no doubt that the VectorExtensometer is providing game-changing capabilities to material testing platforms, but even more transformation in the industry is on the horizon, as automated test systems are increasingly utilized for added efficiency and streamlined operations. Vector can run on a robotic platform operating 24 hours a day, 7 days a week, for example.

When a shift of this magnitude happens, the industry will look for ways to take technology into new fields of innovation. Inquisitive engineers, R&D facilities,



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educational institutions and various types of testing labs will look for improvements to and additional uses for this revolutionary extensometry technology, which will help foster the next iteration of transformation in material testing.

AI-based platforms, like the VectorExtensometer, will add additional capabilities and expand into even more areas of testing. The importance of this continued push towards a digital, data-driven material testing environment will enable simple, quick, repeatable processes that increase quality testing and prevent failure in use.

With a highly validated set of test data, manufacturers can make informed choices on the right materials to use in specific applications.

At-A-Glance: Tinius Olsen VectorExtensometer

Technology Enhancements

- Next-gen on-board graphical and data processing
- Embedded software package using Imetrum DIC algorithms
- Onboard, synchronized LED lighting control
- Sample autodetection
- Cross-correlation and cross-polarizing
- IR cut filtering

Day-to-Day Efficiency

- Simplified operator interaction
- Improved test throughput capacity
- Simplified workflows
- Reduced training requirements

Added Attributes

- Can handle small and non-uniform specimens
- "Toolbox" of DLLs and drivers for digital integration with materials testing software
- Various marking options: dots, rings, lines, speckles (material dependent)
- Material edge and surface tracking available
- Analog or digital output data formats
- Factory & UKAS performance certificates

CURRENT PRODUCT MODELS

VectorExtensometer U200

Single variable length gauge measurement from 25-180mm

Explore Now!

VectorExtensometer U70

Single variable length gauge measurement from 10-50mm

Explore Now!

Video Overview:

Introducing VectorExtensometer - The Future of Extensometry

Watch Now!

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