# Benchmark™

Benchmark is a compact floor model system engineered for high performance and reliability. Its stage is ideal for medium format metrology applications that require high throughput, accuracy, and precision making it a world-class metrology system. Benchmark also offers:

- **Built-in Measurement Stability –** A granite support structure provides vibration isolation and measurement stability for use on the production floor. A rigid cast iron base ensures stability and metrological accuracy.

- **Optical Interchangeable Lenses –** Advanced fixed single-magnification or optional dual-magnification optics, illumination, image processing, and available Continuous Image Capture make it a world-class metrology system.

- **Multisensor Versatility –** Optional touch and scanning probes, TTL Laser, and Rainbow Probe.

## High Performance Compact Floor Model Optical Metrology System

Benchmark™
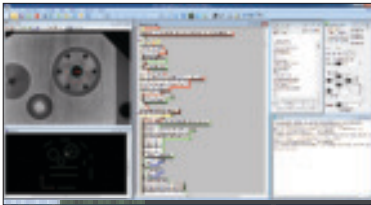
VMS™ software combines a complete tool box for simple feature-based measurements and a dedicated automation scripting environment that allows complete development of custom measurement routines to suit production requirements.
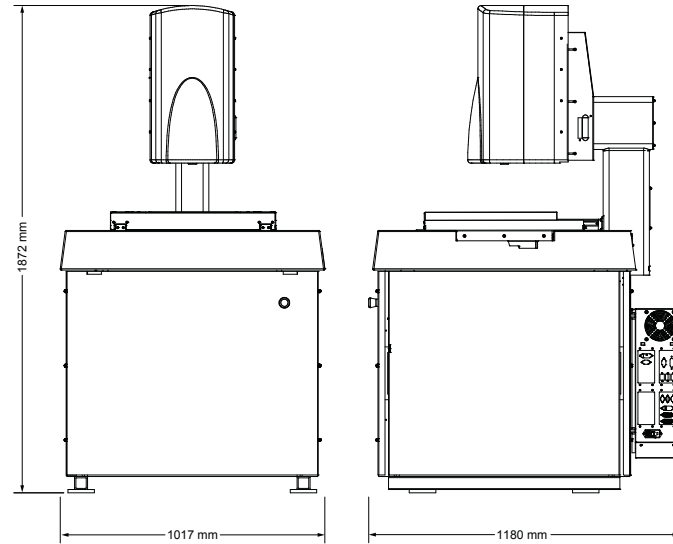

Elements® software is designed specifically for precision measurement of circuit board and electronic assemblies in a high mix manufacturing environment. Elements uses a library of pre-configured SMT component algorithms to automatically create measurement routines from CAD Files.

ZONE3® Metrology Software represents a totally new way of working with multisensor measurement systems, providing faster, easier, and more productive measurements.
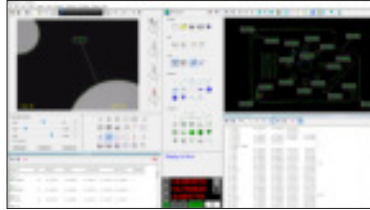
Full feature Measure-X® software offers 2D CAD program generation and general-purpose dimensional measurement with multi-sensor and rotary axis support.

System Weight: 750 kg
Shipping Weight: 970 kg

	Standard	Optional
XYZ Travel	300 x 300 x 200 mm	
XYZ Scale Resolution	0.1 µm, including dual Y-axis scales	0.05 µm
Drive System	DC servo with 4 motorized motions (X, Y, Z, PRL) and multifunction handheld controller	
Worktable	Hardcoat anodized, with fixture holes, removable stage glass, 30 kg recommended max payload	
Rotary Axis		Miniature Servo Rotary (MSR™), MicroTheta Rotary (MTR™), Heavy Duty Rotary (HDR™), High Precision Rotary (HPR)
Optics*	Single magnification, fixed lens; 2.5x lens; 1.0x adapter tube	**Dual Magnification**: Fixed lens optics with field interchangeable front lens **Focus Grid Projector**: LED source with Ronchi or Dot pattern **Laser Adapter:** Allows for field retrofit of TTL Laser. Includes Laser Pointer **Front Lenses:** 1.0x Long Working Distance (LWD), 0.8x, 1.0x, 5.0x, 10.0x, and 25.0x **Factory Installed Adapter Tube:** 2.0x (single magnification optics only)
Illumination**	Substage LED profile (green), Coaxial LED surface (green), Multicolor PRL with motorized angle of incidence adjustment (R/G/B)	**PRL:** All Green, Blue, or White Continuous Image Capture (CIC)
Metrology Camera	2MP digital, monochrome metrology camera	2MP digital, color metrology camera
Field of View	2.78 x 2.07 mm (1.0x tube, 2.5x lens)	**Single Mag FOV:** 8.34 x 6.23 mm (1.0x tube, 0.8x lens) to 0.28 x 0.21 mm (2.0x tube, 25.0x lens) **Dual Mag FOV:** 8.34 x 6.23 mm (0.8x lens) to 0.06 x 0.05 mm (25.0x lens)
Working Distance (with PRL Retracted)	34 mm (2.5x)	Up to 112 mm (0.8x)
Sensor Options***		**Tactile:** TP20 or TP200 Touch Probe, SP25 Scanning Probe **Non-Contact:** Through-the-Lens (TTL) Laser, Rainbow Probe™
Software	• Choice of VMS, ZONE3 Express, or Measure-X metrology software • QVI® Portal	**Metrology software:** ZONE3 Prime, ZONE3 Pro, Elements **Productivity software:** MeasureFit® Plus, SmartFit® 3D, OGP® EVOLVE® Suite (Design, EVOLVE SPC, Manufacturing, SmartProfile®) **Offline software:** ZONE3, Measure-X, VMS, Elements
System Controller	Windows® based, with up-to-date processor and onboard networking/communication ports	
Controller Options		24" flat panel LCD monitor, or dual 24" flat panel LCD monitors, keyboard, 3-button mouse (or user supplied) Integrated and adjustable operator workstation arm
Power Requirements	100-120 VAC or 200-240 VAC, 50/60 Hz, 1 phase, 1000 W	
Safe Operating Environment	15-30 °C, non-condensing	
Rated Environment	Temperature 18-22 °C, stable to ± 1 °C, max rate of change 1 °C / hour, max vertical gradient of 1 °C / meter; 30-80% humidity; vibration <0.001 g below 15 Hz	
XY Area Accuracy	$E_2 = (1.5 + 5L/1000)$ µm	$E_2 = (1.25 + 5L/1000)$ µm (requires optional 0.05 µm scales)
Z Linear Accuracy	$E_1 = (2.0 + 5L/1000)$ µm	$E_1 = (1.4 + 5L/1000)$ µm (requires optional Rainbow or Touch Probe)

Accuracy is evaluated with a QVI verification procedure where "L" is measured length in millimeters. Specifications apply within the rated environment. Optical specifications apply with the standard configuration. XY Accuracy applies with an evenly distributed load up to 5 kg in the standard measuring plane. The standard measuring plane is defined as a plane that is within 25 mm of the worktable surface. Depending on load distribution, accuracy at maximum payload may be less than standard. Accuracy specifications do not apply to Continuous Image Capture (CIC) mode.
*Lenses can be manually interchanged to change magnification and working distance. Adapter tubes can be manually interchanged to change magnification without impacting work distance, but unlike lens changes, adapter tube changes require optical system realignment and recompensation.
**Continuous Image Capture (CIC) only supported in VMS and Elements.
***Touch Probe only supported in Measure-X and ZONE3. Scanning Probe only supported in ZONE3. Rainbow Probe only supported in VMS and ZONE3.

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Confidence. When Results Matter.™