



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

MITUTOYO AMERICA CORP. - CALIBRATION LABORATORY

Elk Grove Village, IL

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 24th day of March 2010.





President & CEO

For the Accreditation Council
Certificate Number 750.01
Valid to February 29, 2012

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

MITUTOYO AMERICA CORP. – CALIBRATION LABORATORY
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CALIBRATION

Valid To: February 29, 2012

Certificate Number: 0750.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Dimensional

| Parameter/Equipment | Range ² | CMC ^{3,4} (±) | Comments |
|-------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------|
| Gage Blocks | (0 to 4) in (0 to 100) mm (5 to 20) in (100 to 500) mm | (1.3 + 0.8L) μin (0.033 + 0.0008L) μm (1 + 1L) μin (0.025 + 0.001L) μm | Electromechanical comparison to master gage blocks |
| Length Standards/ Micrometer Standards | | | |
| Flat End | (0 to 40) in (0 to 1000) mm | (4 + 4L) μin (0.1 + 0.004L) μm | Comparison to master gage blocks |
| Spherical End | (0 to 40) in (0 to 1000) mm | (30 + 5L) μin (0.76 + 0.13 L) μm | |
| Length (of Dimensional Gages) | (0 to 40) in (0 to 1000) mm | (10 + 0.7L) μin (0.25 + 0.0007L) μm | Legex CMM |
| Height Masters | (0 to 40) in (0 to 1000) mm | (3 + 2L) μin (0.076 + 0.002L) μm | Comparison to master gage blocks |



| Parameter/Equipment | Range ² | CMC ^{3,4} (±) | Comments |
|----------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------|
| Check Masters/ Step Gages - Commercial Grade Master Grade | (0 to 40) in (0 to 1000) mm (0 to 40) in (0 to 1000) mm | (20 + 1.2L) μin (0.5 + 0.0012L) μm (10 + 0.7L) μin (0.25 + 0.0007L) μm | Legex CMM |
| Diameter of Sphere | (0 to 3) in (0 to 76) mm | 15 μin 0.38 μm | High accuracy ULM |
| Cylindrical Plug Gage | (0 to 4) in diameter (0 to 102) mm diameter | (12 + 3D) μin (0.3 + 0.003D) μm | High accuracy ULM |
| Pin Gages | (0 to 4) in diameter (0 to 102) mm diameter | (15 + 3D) μin (0.38 + 0.003D) μm | High accuracy ULM |
| Ring Gages | (0 to 12) in (0 to 305) mm | (20 + 3.5L) μin (0.51 + 0.0035L) μm | Master ring gages |
| Thread Measuring Wires | (0 to 140) TPI | 16 μin | High accuracy ULM |
| Pitch Micrometer Standard | (1 to 6) in (25 to 150) mm | (50 + 8L) μin (1.3 + 0.008L) μm | High accuracy ULM |
| Screw Thread Anvils | 60° and 55° | 2.2 min | Optical comparator |
| Calipers | (0 to 12) in (0 to 300) mm (12 to 60) in (300 to 1500) mm | (100 + 2L) μin (0.05 + 0.006L) μm (120 + 4L) μin (3 + 0.004L) μm | Comparison to master gage blocks |
| Height Gages | (0 to 40) in (0 to 1000) mm | (4 + 6L) μin (0.1 + 0.006L) μm | Comparison to Height master step gage |

Peter Abney

| Parameter/Equipment | Range ² | CMC ^{3,4} (±) | Comments |
|--------------------------|---------------------------------|-------------------------------------|----------------------------------|
| Micrometers – | | | Comparison to master gage blocks |
| Outside | (0 to 1) in (0 to 25) mm | 8 μin 0.2 μm | |
| | (1 to 40) in (25 to 1000) mm | (2 + 6L) μin (0.05 + 0.006L) μm | |
| Inside | (0 to 40) in (0 to 1000) mm | (12 + 6L) μin (0.3 + 0.006L) μm | |
| Depth | (0 to 12) in (0 to 300) mm | (10 + 6L) μin (0.25 + 0.006L) μm | |
| Indicating and Snap | (0 to 1) in (0 to 25) mm | 8 μin 0.2 μm | |
| | (1 to 4) in (25 to 100) mm | (2 + 6L) μin (0.05 + 0.006L) μm | |
| V-Anvil Micrometers | (0 to 2) in (0 to 50) mm | (24 + 4L) μin (0.6 + 0.004L) μm | Comparison to master pin gages |
| Micrometer Heads | (0 to 2) in (0 to 51) mm | 28 μin 0.7 μm | High accuracy ULM |
| Dial and Test Indicators | (0 to 0.2) inch (0 to 5) mm | 25 μin 0.6 μm | Dial calibration tester |
| | (0 to 2) inch (0 to 50) mm | 110 μin 1.5 μm | |
| Digimatic Indicators | (0 to 2) in (0 to 50) mm | (6 + 4L) μin (0.15 + 0.004L) μm | Comparison to master gage blocks |
| Dial Indicator Tester | (0 to 2) in (0 to 50) mm | 20 μin 0.05 μm | Comparison to master gage blocks |
| Mu-Checker/Amplifier | (0 to 0.05) in (0 to 1.5) mm | 4 μin 0.1 μm | Comparison to master gage blocks |

Peter Abney

| Parameter/Equipment | Range ² | CMC ^{3,4} (±) | Comments |
|------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------|---------------------------------------|
| Linear Gage with Counter | (0 to 2.00) in (0 to 50) mm | $(6 + 4L) \mu\text{in}$ $(0.15 + 0.004L) \mu\text{m}$ | Comparison to gage blocks |
| Inside Diameter Measuring Instruments (Boremetrics, Holtest, and Bore Gages) | (0 to 12) in (0 to 300) mm | $(20 + 6D) \mu\text{in}$ $(0.5 + 0.006D) \mu\text{m}$ | Ring gages |
| Laser Scan Micrometer | (0 to 2.5) in diameter (0 to 63.5) mm diameter | 35 μin 0.89 μm | Comparison to master pin gages |
| Surface Finish Measuring Instrument | (0 to 400) μin (0 to 10) μm | 2.1 μin 0.053 μm | Comparison to master surface specimen |
| Radius Gages | (0.01 to 1) in (0.25 to 25.4) mm | 0.0005 in 0.012 mm | Optical comparator |
| Angle Gages | (5 to 180) degrees | 1.9 arc minutes | Optical comparator |
| Thickness Gages (Feeler Type) | (0.001 to 0.050) in (0.025 to 1.27) mm | 45 μin 1.1 μm | High accuracy ULM |
| Wire Gages | Size: (0 to 36) | 500 μin | Optical comparator |
| Tap & Drill Gage | (0 to 0.500) in (0 to 12.70) mm | 360 μin 9 μm | Optical comparator |
| Screw Pitch Gages (Leaf Type) | Any Pitch (in or mm) | 400 μin 10 μm | Optical comparator |
| Precision Levels | (0 to 12) in (0 to 305) mm | 100 μin 2.5 μm | Sine bar and gage blocks |
| Digital Protractors | (0 to 90) degrees | 0.06 degrees | Sine bar and gage blocks |
| Thickness Measuring Gages (Digital) | (0 to 2) in (0 to 51) mm | 300 μin 7.6 μm | Comparison to gage blocks |

Peter M. Meyer

| Parameter/Equipment | Range ² | CMC ^{3,4} (±) | Comments |
|------------------------------------------------------|-----------------------------------------------------------|---------------------------------------|--------------------------------------------|
| Thickness Measuring Gages (Dial) | (0 to 2) in (0 to 51) mm | 300 μin 7.6 μm | Comparison to gage blocks |
| Coating Thickness Gage(Digi-Derm and Lamina Checker) | (0 to 0.060) in thick (0 to 1.5) mm thick | 48 μin 1.2 μm | Comparison to master films |
| Ultrasonic Thickness Gage (Mu Gage) | (0 to 20) in (0 to 600) mm | (480 + 25L) μin (12 + 0.025) μm | Comparison to gage blocks |
| Films (Plastic) | (0 to 0.250) in (0 to 6) mm | 20 μin 0.50 μm | High accuracy ULM |
| Sine Bars | 5 in 10 in 127 mm 254 mm | 30 μin 48 μin 0.76 μm 1.2 μm | High accuracy ULM and gage blocks |
| V-Blocks | (0 to 4) in (0 to 102) mm | 64 μin 1.6 μm | Mu checker with lever head probe |
| Riser Blocks | (0 to 24) in height (0 to 600) mm height | (3 + 2H) μin (0.08 + 0.002H) μm | Comparison to master gage blocks |
| Parallel Bars | (0 to 3) in width & height (0 to 76) mm width & height | 30 μin 0.76 μm | Comparison to master gage blocks |
| Adjustable Parallels | (0 to 3.00) in height (0 to 75) mm height | 40 μin 1 μm | Comparison to gage blocks |
| Precision Vise | (0 to 6.00) in clamping (0 to 150) mm clamping | 72 μin 1.8 μm | Comparison to gage blocks and straightedge |

Peter Abney

| Parameter/Equipment | Range ² | CMC ^{3,4} (\pm) | Comments |
|----------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------|
| Line Scales | (0 to 16) in long (0 to 410) mm | $(50 + 5L) \mu\text{in}$ $(1.3 + 0.005L) \mu\text{m}$ | High accuracy quick vision machine |
| | (0 to 16) in long (0 to 410) mm | 24 μin 0.6 μm | Comparison method on high accuracy quick vision machine |
| Pixel Calibration Charts | (0 to 0.16) in (0 to 4) mm | 50 μin 1.3 μm | Comparison method on high accuracy quick vision machine |
| Squares | (0 to 24) in (0 to 610) mm | 6 $\mu\text{in/in}$ 0.006 $\mu\text{m/mm}$ | Comparison to master square |
| | (0 to 40) in (0 to 1000) mm | $(3 + 0.7L) \mu\text{in}$ $(0.076 + 0.0007L) \mu\text{m}$ | Legex CMM using reversal technique |
| Roundness | Normal Method: (0 to 16) in diameter (0 to 400) mm diameter | $(0.8 + 0.6H) \mu\text{in}$ $(0.02 + 6H/10\ 000) \mu\text{m}$ | High accuracy roundness machine |
| | Reversal Method: (0 to 2) in diameter (0 to 50) mm diameter | 0.2 μin 0.005 μm | |
| Circular Flatness (Optical flat) | Normal Method: (0 to 16) in diameter (0 to 400) mm diameter | $(0.9 + 0.3D) \mu\text{in}$ $(0.023 + 3D/10\ 000) \mu\text{m}$ | High accuracy roundness tester |
| Flatness | (0 to 12) in diameter (0 to 300) mm diameter | 2 μin 0.05 μm | Comparison to master optical flat under monochromatic light source |
| Straightness (Straight Edge) | Normal Method: (0 to 13.8) in long (0 to 350) mm long | 12 μin 0.3 μm | High accuracy roundness tester |
| | Reversal Method: (0 to 13.8) in long (0 to 350) mm long | 1 μin 0.025 μm | |

Peter Abney

| Parameter/Equipment | Range ² | CMC ^{3,4} (±) | Comments |
|-----------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------|
| Parallelism (On Cylindrical Squares) | Reversal Method: (0 to 13.8) in height (0 to 350) mm height | 0.25 μin/in 0.25 μm/m | High accuracy roundness tester |
| Pitch Standard (Formtracer & Contracer) | (0 to 8) in long (0 to 200) mm long | (36 + 3.5L) μin (0.9 + 3.5L) μm | High accuracy form-tracer machine |
| Surface Finish Specimen | Ra (0 to 200) μin Ra (0 to 5.1) μm Ra (200 to 500) μin Ra (5.1 to 12.7) μm | 2 μin 0.051 μm 3 μin 0.076 μm | Surface finish tester |
| Step Height Specimen | (0 to 0.120) in height (0 to 3) mm height | 3 μin 0.075 μm | High accuracy form-tracer machine |
| Surface Finish Spherical Surface | Ra (0 to 400) μin Ra (0 to 10) μm | 3 μin 0.075 μm | High accuracy form-tracer machine |
| Thickness and Parallelism (Optical Parallels) | | | Comparison to master gage blocks |
| Thickness | (0 to 2) in diameter and 1 in thickness (0 to 50) mm diameter and 25 mm thickness | 5 μin 0.130 μm | |
| Parallelism | (0 to 2) in diameter and 1 in thickness (0 to 50) mm diameter and 25 mm thickness | 3 μin 0.075 μm | |
| Angle Gage Blocks | Up to 90° | 1 arc second | High accuracy CMM |

Peter Abney

| Parameter/Equipment | Range ² | CMC ^{3,4} (±) | Comments |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------|
| Overlay Charts – Radius/Diameter Angle Grid/Length | (0 to 16) in diameter (0 to 400) mm diameter (0 to 360)° (0 to 16) in (0 to 400) mm | (85 + 8D) μin (2.2 + 0.008D) μm 25 arc seconds (85 + 8L) μin (2.2 + 0.008D) μm | High accuracy vision machine |
| Reticles – Radius/Diameter Angle Grid/Length | (0 to 1) in diameter (0 to 25) mm diameter (0 to 360)° (0 to 1) in (0 to 25) mm | 60 μin 1.5 μm 15 arc seconds 60 μin 1.5 μm | High accuracy vision machine |

II. Mechanical

| Parameter/Equipment | Range ² | CMC ³ (±) | Comments |
|-----------------------------------|--------------------|----------------------|--------------|
| Hardness Tester (Leeb Scale) | (500 to 900) HLD | 18 HLD | ASTM A956-06 |
| Hardness Test Blocks (Leeb Scale) | (500 to 900) HLD | 20 HLD | ASTM A956-06 |

III. Thermodynamic

| Parameter/Equipment | Range | CMC ³ (±) | Comments |
|--------------------------|---------------|----------------------|---------------|
| Temperature ⁵ | 0 °C to 30 °C | 0.14 °C | By comparison |

Peter Abney

¹ This laboratory offers commercial calibration services.

² Metric equivalencies for these ranges and associated Calibration and Measurement Capability are also available.

³ Calibration and Measurement Capability (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. Calibration and Measurement Capabilities represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

⁴ In the statement of Calibration and Measurement Capability, L is the length in inches/millimeters; D is the diameter in inches/millimeters; H is the height in inches/millimeters and R is the resolution in $\mu\text{in}/\mu\text{m}$.

⁵ For internal laboratory calibration only. Not available as a commercial calibration service.

