



METROLOGÍA E INGENIERIA INVERSA

SOBRE NOSOTROS

IMDE nace en 2005, como una empresa de manufactura y diseño de dispositivos de prueba y ensamble, enfocados a la cadena de suministro automotriz.



Misión

Generar soluciones en medición, automatización y manufactura, que brinden respuestas efectivas a las necesidades de nuestros clientes y del sector industrial, con los más altos niveles de calidad requeridos, en un menor tiempo.



Visión 2020

Nuestra presencia en el sector industrial es tres veces más alta, por la diversificación en la misma proporción de nuestros productos, la mejora de nuestra capacidad técnica y la tecnología más avanzada en nuestra infraestructura.



Política ambiental

Utilizar materiales de fácil reincorporación a una economía circular y brindar condiciones de mantenimiento necesarias para prolongar la vida útil.



Metrología e Ingeniería inversa



Dispositivos de prueba eléctrica, herrajes, contras de montaje y sub-ensamble



Fabricación de moldes, pulido de corazones, recuperación de geometría, sistemas de des-moldeo, electrodos al cobre berilio y dispositivos de fin de brazo



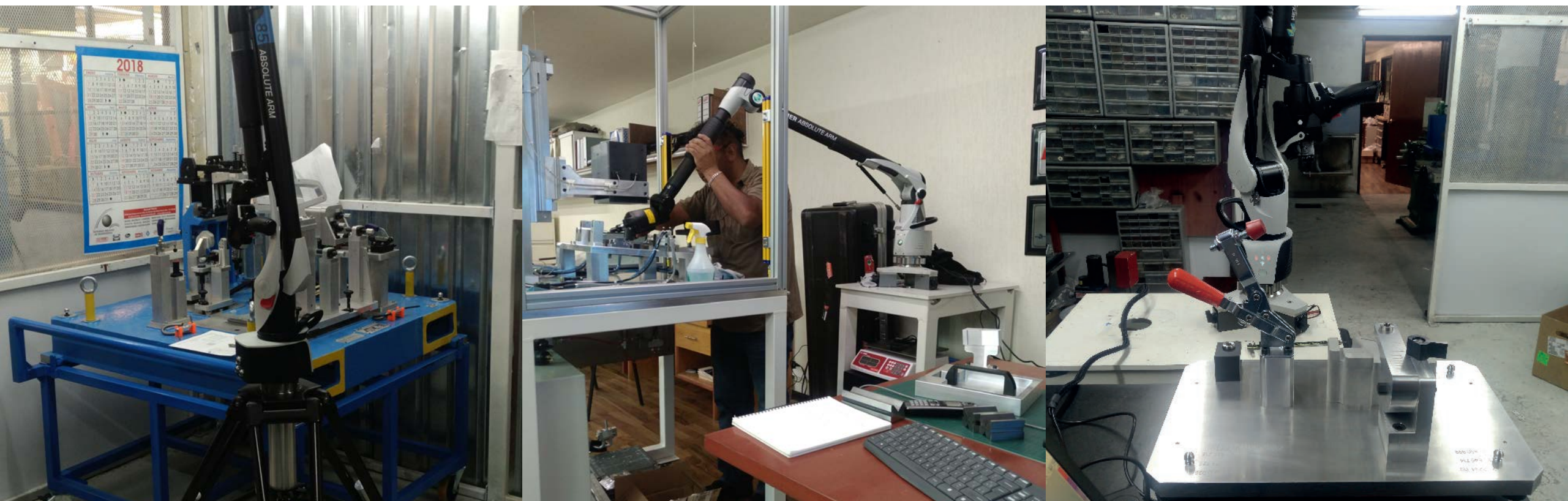
Calibradores, gauges, dispositivos de verificación y Mecanizados de precisión



Integración y automatización de procesos y líneas de producción.

Ingeniería inversa y metrología

- Medición de pieza en sitio
- Medición por contacto
- Medición por escaneo
- Certificación según la norma ISO 10036
- Escaneo y modelado de superficies





Pc

- Reporte dimensional con modelo matemático 3d o sin modelo,
- ingeniería inversa,
- escaneo 3d generador de nube de puntos y reportes dimensionales
- y modelado de superficies.



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VENTAS

ventas@imde.com.mx
722 764 96 96
7291072080
ID 32*7*39143
01 (722) 274 22 75



CONTABILIDAD Y ADMINISTRACIÓN

administraciónycontabilidad@imde.com.mx
01 (722) 2742275



SERVICIO AL CLIENTE

atenciónclientes@imde.com.mx
722 523 69 67
ID 91*15*55932
01 (722) 274 22 75

CERTIFICATE OF CALIBRATION

Report

Number 20193-9077-UC
Issue date 27 March 2019

Customer

Company Hexagon Metrology Mexico
Address
Blvd Isidoro Sepulveda #600-2 / Apodaca, NL 66633 (MX)
Phone +52 81 8 3214530

Instrument

Type Articulated Arm Coordinate Measuring Machine (AACMM)
Serial number 8525-7-9077-UC
Model 8525-7
Measuring range 2500 mm
Calibration date 27 March 2019

Tests

Standard ISO 10360-12 : 2016

The instrument listed above was calibrated and tested under monitored and compensated environmental conditions, using gauges that are traceable to national laboratories. Environmental conditions during the tests and identification numbers for the instrument and gauges are reported below in this certificate. The calibration and test procedures conformed to ISO 10360-12.

Results

Probing performance of the AACMM	Pass
Articulation performance of the AACMM	Pass
Length measuring performance of the AACMM	Pass

See the last page of this certificate for detailed measurement results.

Acceptance

We hereby certify that the AACMM listed above passed all acceptance tests.

27 March 2019

Operator

Juan Gonzalez

Inspector

Philip Climaco

CERTIFICATE OF CALIBRATION

Terms and definitions

AACMM	Articulated Arm Coordinate Measuring Machine.
Measuring range	Diameter of the spherical volume within which an AACMM is capable of measuring. Specified by the manufacturer.
Cone	Mechanical, kinematic seat (nest) that repeatably holds the center of a spherical surface in a fixed position in space.
Artefact	Calibrated, traceable reference object (e.g. a bar with known length).
P_{Size}	Probing size error, tactile. Unabbreviated symbol is P _{Size Sph. 1x25 Tact AACMM}
P_{Form}	Probing form error, tactile. Unabbreviated symbol is P _{Form Sph. 1x25 Tact AACMM}
L_{Dis}	Articulated location error, tactile. Unabbreviated symbol is L _{Dis 5x5 Art Tact AACMM}
E_{Uni}	Length measurement error, unidirectional. Unabbreviated symbol is E _{Uni 0 Tact AACMM}
MPE	Maximum Permissible Error.
Specification	MPE for the relevant AACMM acceptance test, as specified by the manufacturer.
Deviation	Difference between the calibrated value and the measured value of the test artefact.
Acceptance	The performance of the AACMM is verified for each acceptance criteria (probing size error, probing form error, articulated location error, and length measurement error). The error is not greater than the MPE specified by the manufacturer.

Instrument calibrated

Type	AACMM
Brand	Hexagon
Serial number	8525-7-9077-UC
Model	8525-7
Measuring range	2500 mm
Probe	50mm length, 15mm ball

Environmental conditions

Temperature (°C)	20.1
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Gauge(s) used

Nomenclature	Serial number	Report number	Calibration date	Calibration due
Length bar artefact	71131	21363	25 July 2018	25 July 2019
Sphere artefact	HEXSPH50-01	HEXSPH50-01 323830	29 October 2018	29 October 2019
Temp monitor	CAL-266	TME-107460	16 October 2018	16 October 2019

Traceability

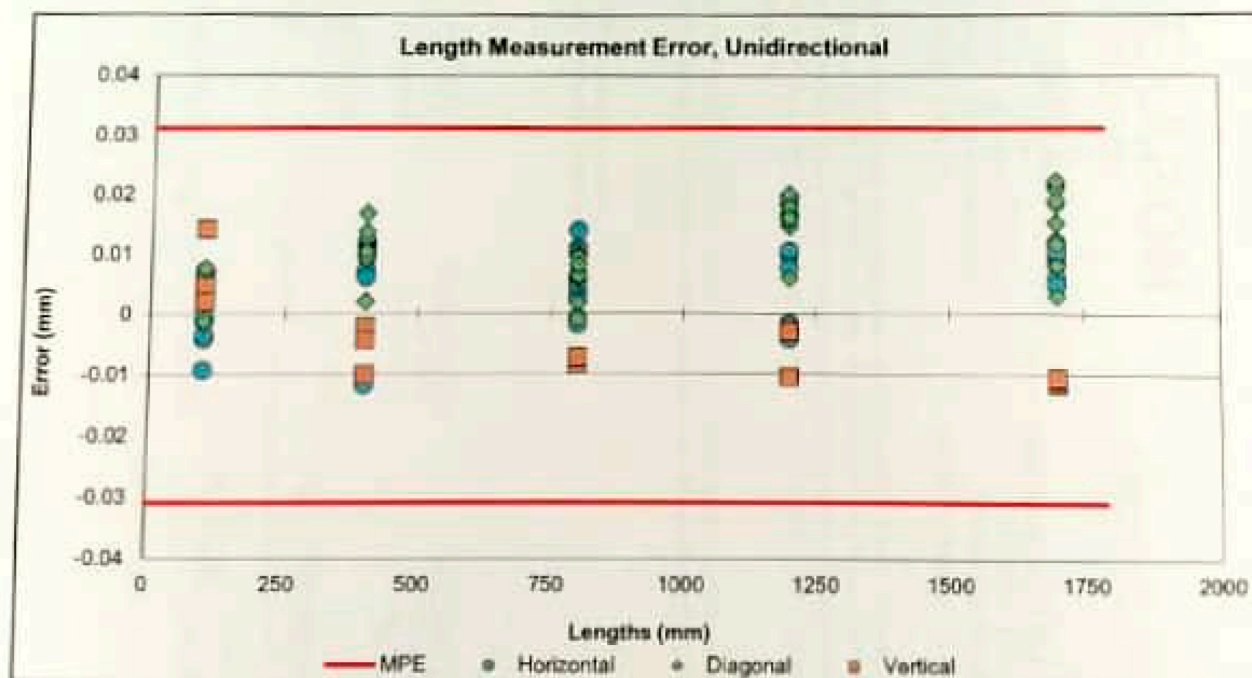
This certification is traceable to national standards and laboratories via the gauges listed above.

CERTIFICATE OF CALIBRATION

Measurement results

The measurement results for each AACMM acceptance test are listed below.

Symbol (abbreviated)	Specification (mm)	Measure (mm)	Result (Pass / Fail)
P_{Size}	0.012	0.007	Pass
P_{Form}	0.025	0.018	Pass
L_{Dis}	0.048	0.026	Pass
E_{Uni}	0.031	0.022	Pass



This is the acceptance test to determine length measuring performance per ISO 10360-12. The chart shows the calculated error for the 105 length measurements defined in ISO 10360-12. The length measurement error is the difference between the measured value and the calibrated value of the test length.



Hexagon Metrology Inc
3536 Seagate Way
Oceanside, CA 92056

Scanning System Verification Report

Report number:

RCC190878525-7-9077-UC - 19-07-518A

Customer: Hexagon Metrology Mexico

Scanning System:

8525-7-9077-UC

Scanning Sensor:

19-07-518

Description:

Scanning System Accuracy

Scanner:

RS5 Laser Scanner

Temperature: 20.5°C

Technician: Jgonzalez

Date of verification: 3/27/2019

Hexagon Metrology Inc. certifies that at the time of shipment the above listed instrument meets or exceeds all published manufacturer specifications. It has been calibrated using standards that are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) or other national laboratories. Hexagon Metrology Inc. quality management system is ISO9001:2015 registered. This certificate shall not be reproduced, except in full, without written consent from Hexagon Metrology Inc. unless otherwise indicated in the remarks section. The test involves measuring a certified

System Model:

8525-7

System Accuracy Spec:

0.048 mm

System Accuracy Attended:

0.031 mm

Gauge used:

Nomenclature

Serial number

Report number

Calibration date

Gauge certificate enclosed

Certified sphere

4392-23

169923

2/6/2019

Sphere 1 @ 20%	
1-2	0.0134
1-3	0.0118
1-4	0.0211
1-5	0.0222
2-3	0.0218
2-4	0.0310
2-5	0.0283
3-4	0.0133
3-5	0.0177
4-5	0.0100
MAX	0.0310
STDD	0.0189
Diam dev	-0.0139

Sphere 2 @ 50%	
1-2	0.0115
1-3	0.0224
1-4	0.0237
1-5	0.0166
2-3	0.0258
2-4	0.0306
2-5	0.0237
3-4	0.0162
3-5	0.0148
4-5	0.0072
MAX	0.0306
STDD	0.0180
Diam dev	-0.0152

Sphere 3 @ 80%	
1-2	0.0110
1-3	0.0013
1-4	0.0079
1-5	0.0158
2-3	0.0107
2-4	0.0163
2-5	0.0153
3-4	0.0092
3-5	0.0166
4-5	0.0133
MAX	0.0175
STDD	0.0161
Diam dev	-0.0158

Technician:

Lab Manager:



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Certificate of Traceable Calibration

Page 1 of 1

Report Number: HCC00179-2-10407A
Customer Name: Hexagon Metrology Mexico
Address: Blvd. Satcon, Seaports 1000-2
Newport, RI, 02840
Contact Phone: +52 91 8 3214550

Model Number: 32175
Serial Number: 32175-2-10407
Description: Certified Length Bar
Procedure: 1-CAL-05

Env. Temperature: 20.2°C
Humidity: 54%
Technician: Philip Olinari
Date of Calibration: 18-Sep-2019

Hexagon Metrology Inc. certifies that at the time of shipment the above listed instrument meets or exceeds manufacturer specifications. Evaluation conducted under the environmental conditions stated above, using equipment in compliance with ISO 17025 and traceable to the International System of Units (SI) through National Institute of Standards and Technology (NIST) or other national laboratories. Equipment used is noted on the following page. All required documentation and calibration data is on file at Hexagon Metrology. The measurement uncertainty was calculated according to NIST Technical Note 1297, where possible, with a coverage factor of $k=2$ which provides a level of confidence of approximately 95%.

Hexagon Metrology Inc. quality management system is ISO9001:2008 registered, ANSI/NCCL Z-540.1 and ISO 17025 Accredited. Environmental conditions are constantly monitored and compensated. This certificate shall not be reproduced, copied in full, without written consent from Hexagon Metrology Inc. unless otherwise indicated in the remarks section.

Remarks:

As Received Conditions: Measured values were IN SPECIFICATION at the points tested.

As Shipped Conditions: Measured values were IN SPECIFICATION at the points tested.

Standards Used

Reference Material

Calibration Standard

Serial Number

1011-6054JA

CAL-086

Report #

917201621-102047

TMR-107460

Calibration Date

17-Sep-2019

18-Oct-2019

Calibration Due Date

18-Sep-2020

18-Oct-2020

Description

Case A - Case B

Case A - Case C

Measured Length (mm)

301.888

311.327

Expanded Uncertainty (mm)

0.0026

0.0033

QA Signature

Device calibration and certification test conducted by:

Hexagon Metrology Inc. 3536 Seaports Way Ste 100, Oceanside, CA 92056

DOC # 4-CAL-21 Rev. F

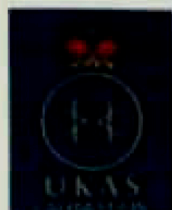


Certification #

AC-1283

DOC Rel Date

27-Aug-2018



0102

CERTIFICATE OF CALIBRATION

ISSUED BY TN UNITED KINGDOM, LTD

DATE OF ISSUE 18 January, 2019

CERTIFICATE NUMBER 168699

Page 1 of 1 pages

Approved Signature

B. De Padova

TN UNITED KINGDOM, LTD

Unit K, Downlands Business Park, Lyons Farm

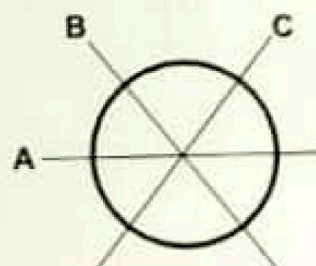
Worthing, West Sussex. BN14 9LA

Tel: +44 (0)1903 891200, Fax: +44 (0)1903 891220

Customer: Hexagon Metrology, INS Oside
3536 Seagate Way
Oceanside CA
92056 USA

Calibrated in: U.K.

Order No: 435548
Date of Calibration: 18-Jan-19
Description: CMM Reference Ball
Part No: NCA7-7-52013
Size: 25.400mm $\pm$ 0.5 μ m Grade 10
Material: Stainless 440C
Serial No: 4393-86
Ident No: —
Report: The ball has been calibrated against the Laboratory Standards for diameter on one plane(s) with the measured diameter(s), corrected for elastic compression and expressed to the nearest 0.000 05mm given below, and for roundness on one plane(s) with the results as given below.



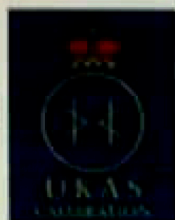
Plane	Corrected diameter (mm)	Roundness (μ m) (LSC: $\Delta r =$)
A	25.400 35	0.06
B	---	---
C	---	---

Roundness Uncertainty $\pm$ 0.025 μ m (1 μ in)
Uncertainty of Measurement $\pm$ 0.000 65mm
Equipment: DIAMETER: Heidenhain ND281B + CT6001 Transducer @ 1N
ROUNDNESS: Talyrond 73PC Roundness Analyser
Temperature: 20° C $\pm$ 1° C
Traceability: To National Standards via Gauge Blocks serial no: 10054
For USA: To NIST on Certificate No. 683/289259-17

This Laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system. (refer joint ISO-ILAC-IAF communiqué dated Jan 2009).

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.



0102

CERTIFICATE OF CALIBRATION

ISSUED BY TN UNITED KINGDOM, LTD

DATE OF ISSUE 6 February, 2019

CERTIFICATE NUMBER 169923

Page 1 of 1 pages

Approved Signature

B. De Padova

TN UNITED KINGDOM, LTD

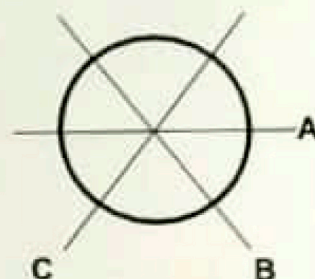
Unit K, Downlands Business Park, Lyons Farm

Worthing, West Sussex. BN14 9LA

Tel: +44 (0)1903 891200, Fax: +44 (0)1903 891220

Customer: Hexagon Metrology, Ins Oside
3536 Seagate Way,
Oceanside,
CA 92056, United States

Calibrated In: U.K.
Order No: 435548
Date of Calibration: 6-Feb-19
Description: Modified Precision Ball (Matt Finish)
Part No: NCA7-7-20494
Size: 25.400mm $\pm$ 2.5 μ m Grade 25
Material: Tungsten Carbide
Serial No: 4392-23



Report: The ball has been checked against the Laboratory Standards for diameter on one plane with the measured diameter, corrected for elastic compression and expressed to the nearest 0.000 05mm given below, and for roundness on one plane with the result, to the nearest 0.1 μ m, given below.

Plane	Undeformed diameter (mm)	Roundness (μ m)	Surface Finish (μ m)*
		(LSC: $\Delta r =$)	(Ra)
A	25.400 10	0.22	0.23

* NOTE: Not UKAS Accredited but included for completeness and expressed to the nearest 0.1 μ m.

Uncertainty of Measurement: $\pm$ 0.000 25mm

Roundness Uncertainty: $\pm$ 0.025 μ m

Equipment: Diameter: Heidenhain ND281B + CT6001 Transducer @ 1N

Roundness: Talyrond 73PC Roundness Analyser

Surface Finish: Form Talysurf Intra System

Temperature: 20°C $\pm$ 1°C

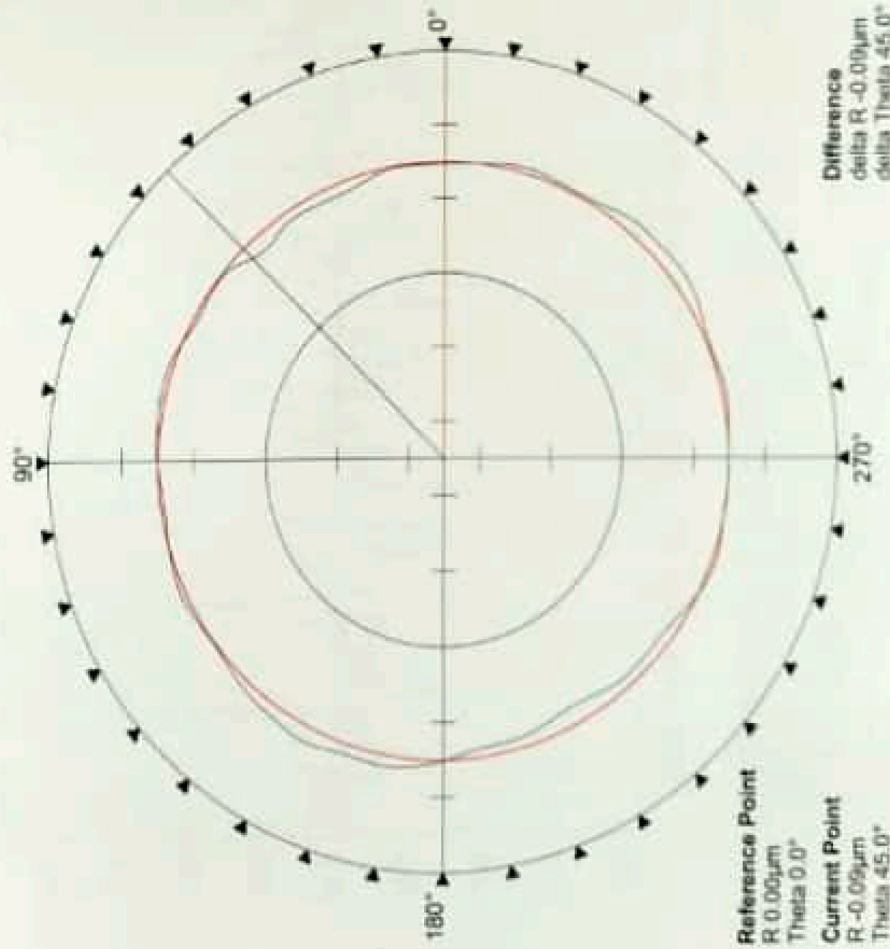
Traceability: To National Standards via Gauge Blocks serial no: 10054

For U.S.A.: To NIST on Certificate No: 683/289259-17

This Laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF communiqué dated 18 June 2005).

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory

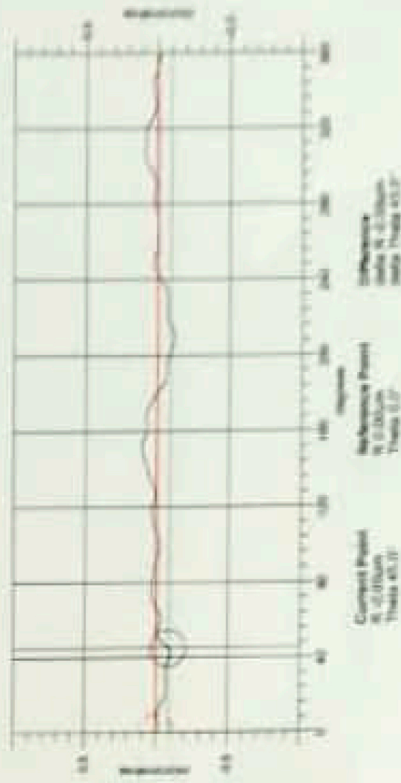
Scale 0.5 μ m/div.

TN UNITED KINGDOM, LTD

Roundness Report

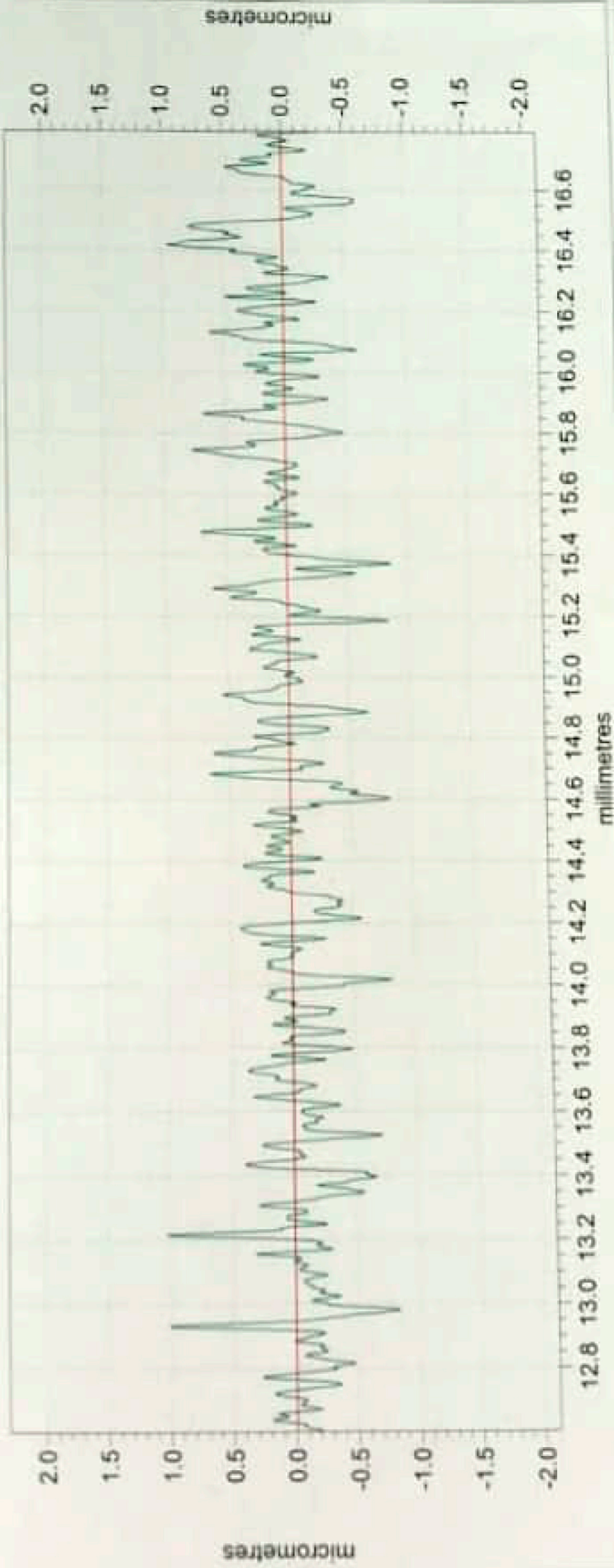
Part No: NCA7-7-20494
Serial No: 4392-23

RONT	0.22	μm
Ecc	1.04	μ m
Instrument Type	Talyrond73	
Filter Range	1-15 μ r	
Filter Type	Gaussian	
Reference Type	LS Circle	
Datum	Spindle	
Time	29/01/2019 10:03:38	



28/01/2019 16:01:47

28/01/2019 16:01:29



Ra	0.2340	μm	Rq	μm	0.3026	μm
			Rt	μm	1.8995	μm
				Rmr(C)	49.29	% Height (mean)
					0.000	μm
			Rz	μm	1.4873	μm
				Rmr	50.00	% offset
					0.000	μm
						50.00