

MADE TO MEASURE CALIBRATION REPORT

Customer :

Made To Measure

302 East Main street, East Dundee, IL 60118

Machine:

Wenzel LH1512

(Made To Measure ID: CMM-4)

Machine Number :

127168

Calibration Date :

2/14/2023

Calibration Valid Trough Date:

2/14/2024

Machine Accuracy Specification:

MPE(E0)=

± 2.5 + (L / 250)

L - measurement length in mm

MPE(P) = 2.0µm

Machine Axes Length (X,Y,Z):

1500, 2000, 1200

Calibrated Axes Length (X,Y,Z):

1500, 2000, 1200

Certificate Number :

MTMC2023.2.127168

We trust that these results meet your satisfaction, please call should you require additional information or clarification.

This is to certify that the calibration procedure performed on the machine noted above was completed in compliance with ISO/IEC 17025:2017, and the calibration was verified using test method according to International Standard ISO 10360-2:2009.

The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI).

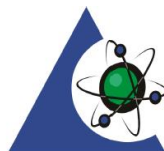
Copies of the calibration reports, calibration certificates and equipment used are on file at this facility and are available for your review.



302 E. Main St., East Dundee, IL 60118
(847) 851-1160

www.measure911.com

Managing Director : Sven Bley



PJLA
Calibration
Accreditation# 59334

Reviewed By :

precision delivered

Statement of Compliance

MTMC2023.2.127168

 Customer: **Made To Measure**
 Address: **302 East Main street,
 East Dundee, IL 60118**

 Procedure instructions: **MTM PRO 5.4.3 REV 1**
 Procedure address: **302 E. Main St., East Dundee,
 IL 60118**
Machine S/N: **127168**Calibrated by: **Stephen Kukla**

System description
Machine Model: Wenzel LH1512
CMM type: Bridge
Probing system (S/N): RSP2
Stylus system: 6x10 RSH250
Basic software: MODUS 1.11
Articulation system (S/N): REVO2
Modes of operation: DCC
Maximum diagonal travel: 2773 mm
Measuring volume (X,Y,Z): 1500, 2000, 1200
Resolution: 0.1 µm

Conditions	Rated	Observed ^I	Comments
Ambient Temperature Range 1	18 - 22 °C	21.4-21.7	PASS
Ambient Temperature Range 2	16 - 26 °C	-	-
Maximum change in Temperature per hour	2 °C/8hr	0.3	PASS
Ambient Relative Humidity	(20 - 80) %	40.0	PASS

Performance Specification ^{II} (L - measurement length in mm)			
Maximum permissible error of length measurement	MPE*(E0)	± 2.5 + (L / 250)	µm
Maximum permissible error of length measurement	MPE*(E150)	N/A	µm
Maximum permissible limit of repeatability range	MPL*(R0)	2.0	µm

Results Summary: AS FOUND = AS LEFT (FINAL)

(see enclosed documents for details)

	Maximum permissible value (µm)	Maximum value observed (µm)	Expanded uncertainty ^{III} (µm)	Verification status
Length measurement error	±13.6	-4.3	±1.3	PASS
Repeatability range (R)	2.0	1.5	±0.4	PASS

Other findings (please describe any occasional or constant potential source of influence other than controlled - eg. proximity of external heat source, indicate any corrective action)

Equipment used:	Certificate	Date	Due Date	Equipment used:	Certificate	Date	Due Date
1010mm Step Gage	10016901	5/2/2022	5/2/2023				
DIGITAL THERMOMETER	192043407	4/26/2021	4/26/2023				

Statement of Compliance

This is to certify that the machine under calibration **has met performance requirements** specified above. The decision was made according to **ISO 14253-1:2017 - Decision rules for providing conformance or non-conformance with specifications**.

Interpretation and opinion (please give recommendations on how to use the calibration results and guidance to be used for improvements)

CMM Service Manager:


Date: 2/14/2023




I - All environmental conditions observed during the test are on file and available for review.

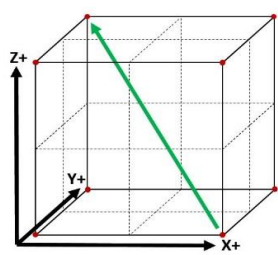
II - Asterisk symbol (*) next to the length error symbols such as E0* signifies that material standard of size was produced by means of laser interferometry which is considered a non-normal CTE standard of size.

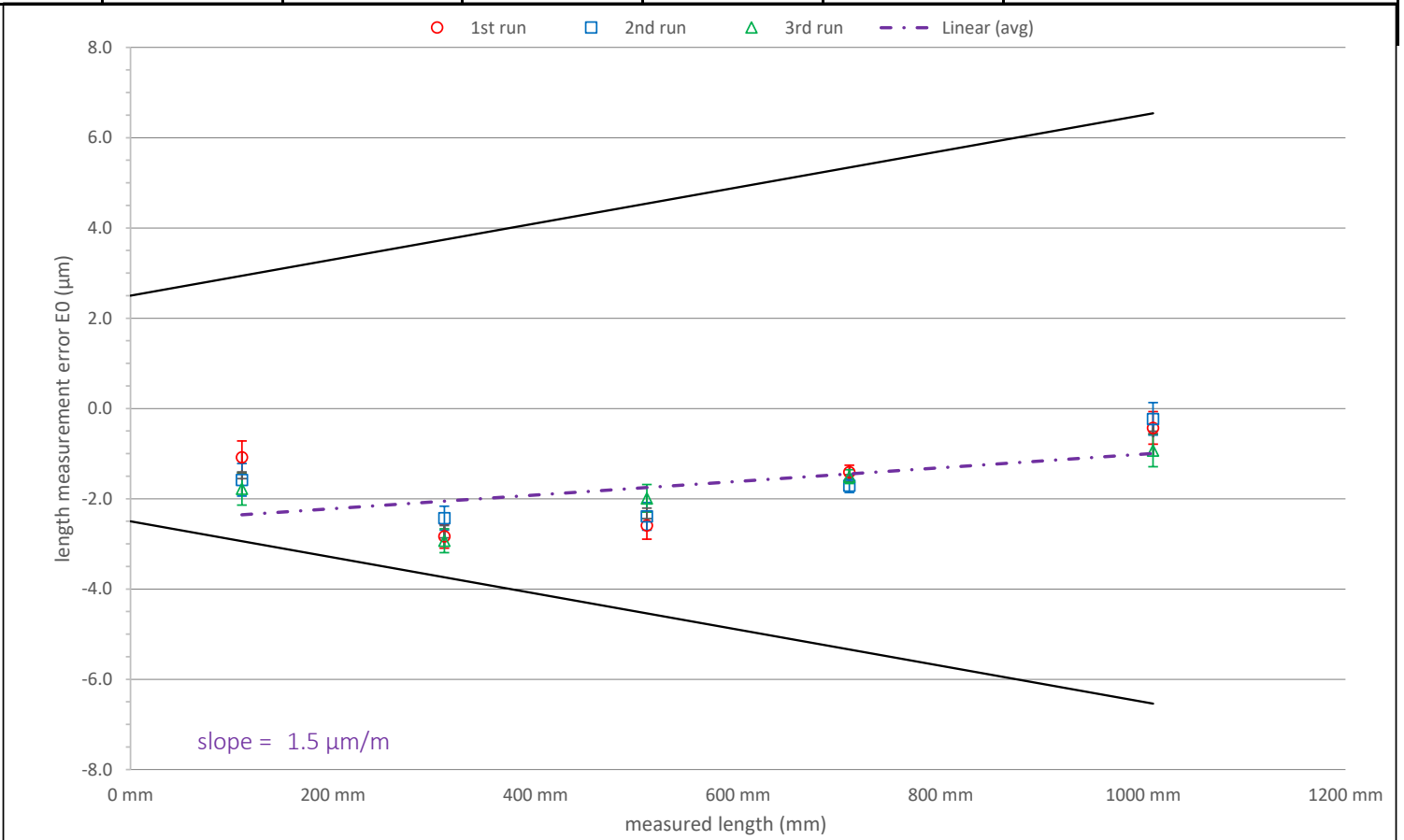
III - reported test uncertainty is expanded using a coverage factor of k=2 for a level of confidence of approximately 95%.



 www.measure911.com	SPACE DIAGONAL - POS. 1: MAX LENGTH = 2773mm		302 E. Main St., East Dundee, IL 60118 (847) 851-1160
	MPE(E0): $\pm 2.5 + (L / 250)$	MPE(P): 2.0 μ m	Completion date: 2/14/2023
<i>L - represents the measurement length in mm</i>			
Material Standard of Size: 0-1010mm Step Gage			

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Length:	1	2	3	4	5
	110 mm	310 mm	510 mm	710 mm	1010 mm
Run 1	-1.1	-2.8	-2.6	-1.4	-0.4
Run 2	-1.6	-2.4	-2.4	-1.7	-0.2
Run 3	-1.8	-2.9	-2.0	-1.5	-0.9
Repeatability	0.7	0.5	0.6	0.3	0.7



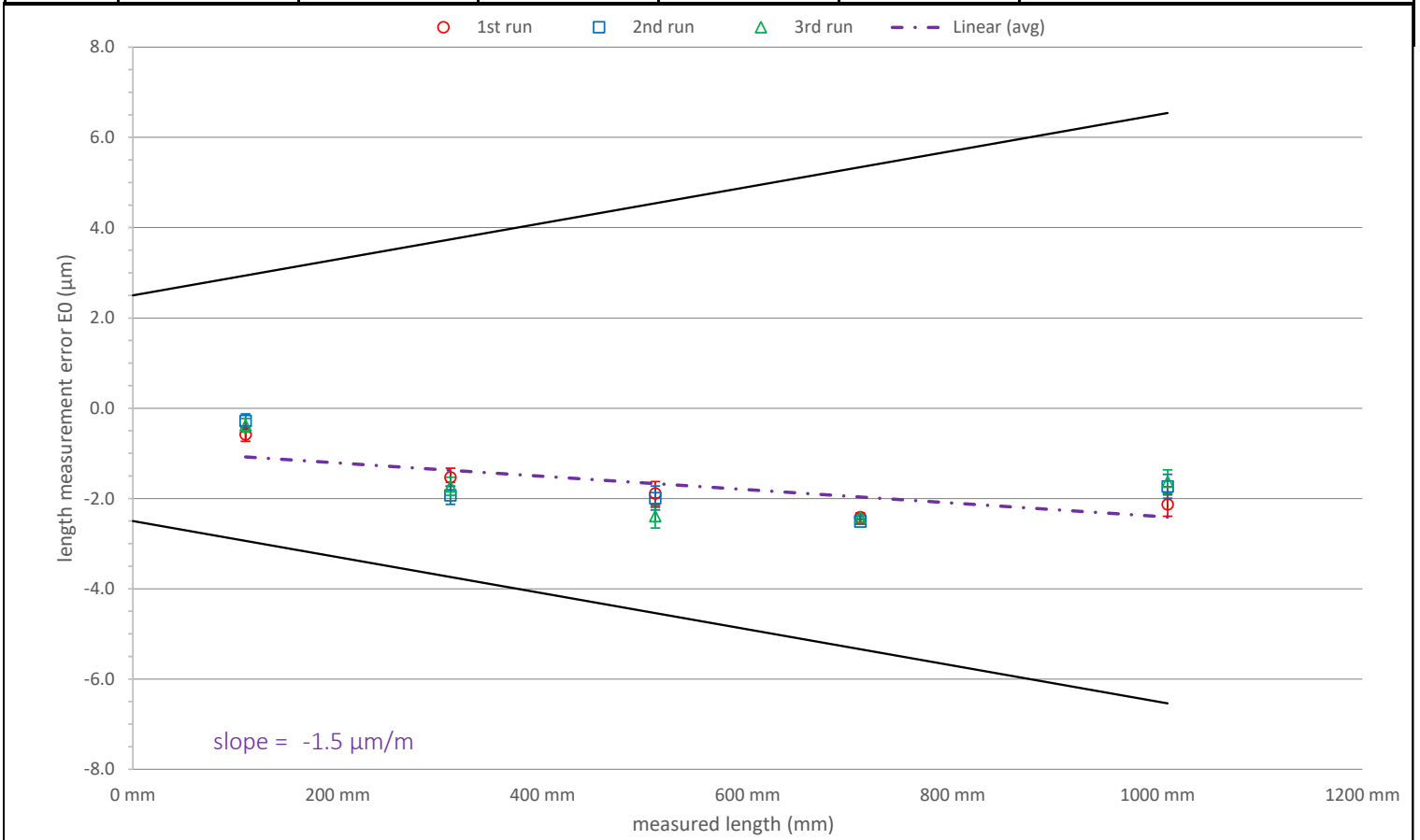
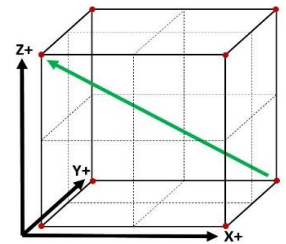



 <p>www.measure911.com</p>	<p>SPACE DIAGONAL - POS. 2: MAX LENGTH = 2773mm</p>		<p>302 E. Main St., East Dundee, IL 60118 (847) 851-1160</p>
			<p>Inspected by: Stephen Kukla Title: Calibration Technician Signature: </p>
<p>MPE(E0): ± 2.5 + (L / 250)</p>	<p>MPE(P): 2.0µm</p>	<p>Completion date: 2/14/2023</p>	
<p><i>L - represents the measurement length in mm</i></p>			

Material Standard of Size: 0-1010mm Step Gage

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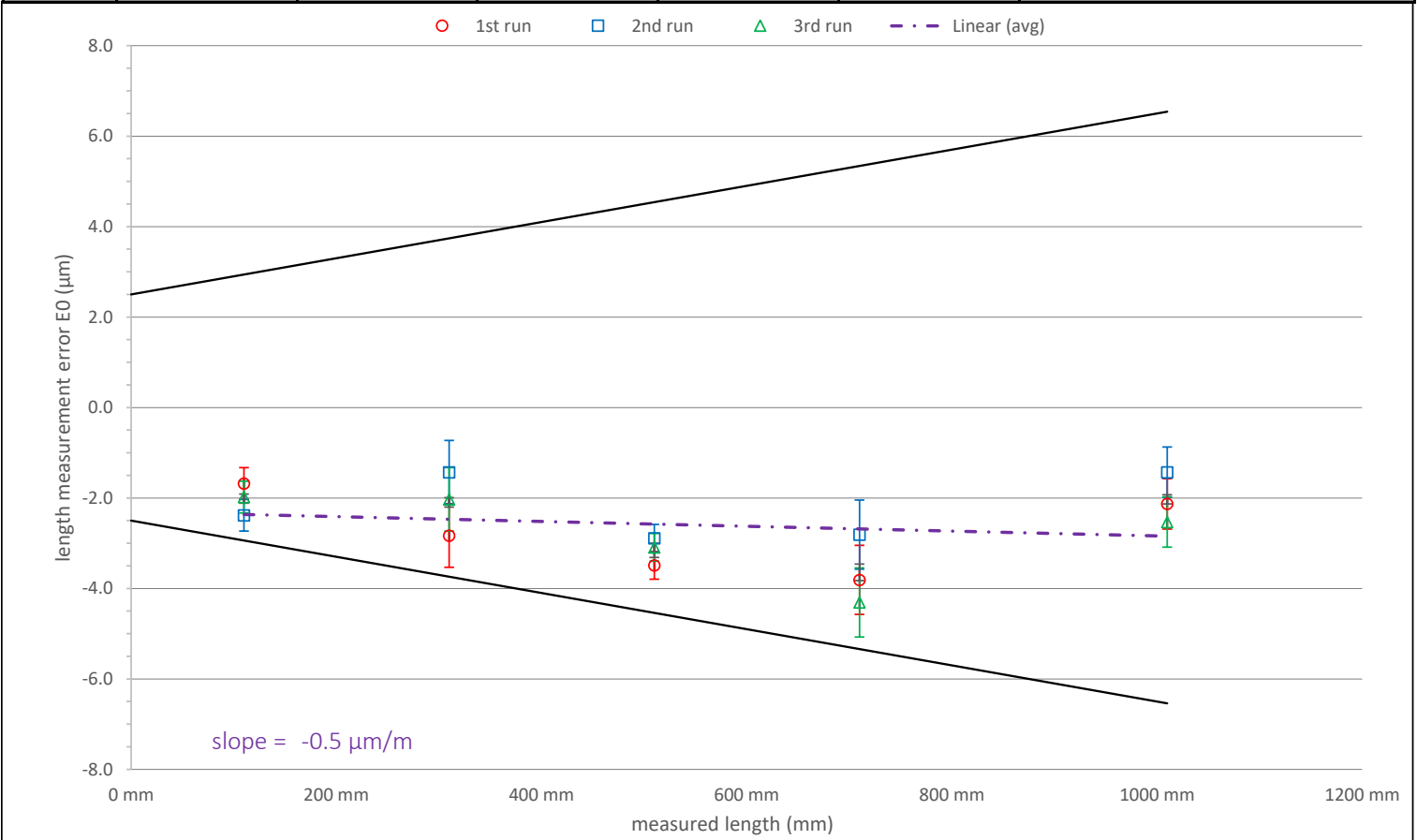
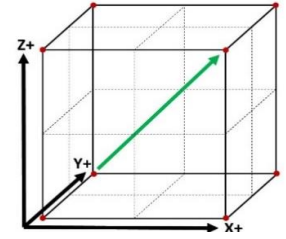
Length:	1	2	3	4	5
	110 mm	310 mm	510 mm	710 mm	1010 mm
Run 1	-0.6	-1.5	-1.9	-2.4	-2.1
Run 2	-0.3	-1.9	-2.0	-2.5	-1.7
Run 3	-0.4	-1.7	-2.4	-2.4	-1.6
Repeatability	0.3	0.4	0.5	0.1	0.5




 www.measure911.com	SPACE DIAGONAL - POS. 3: MAX LENGTH = 2773mm		302 E. Main St., East Dundee, IL 60118 (847) 851-1160
	MPE(E0): $\pm 2.5 + (L / 250)$	MPE(P): 2.0 μ m	Completion date: 2/14/2023
<i>L - represents the measurement length in mm</i>			
Material Standard of Size: 0-1010mm Step Gage			

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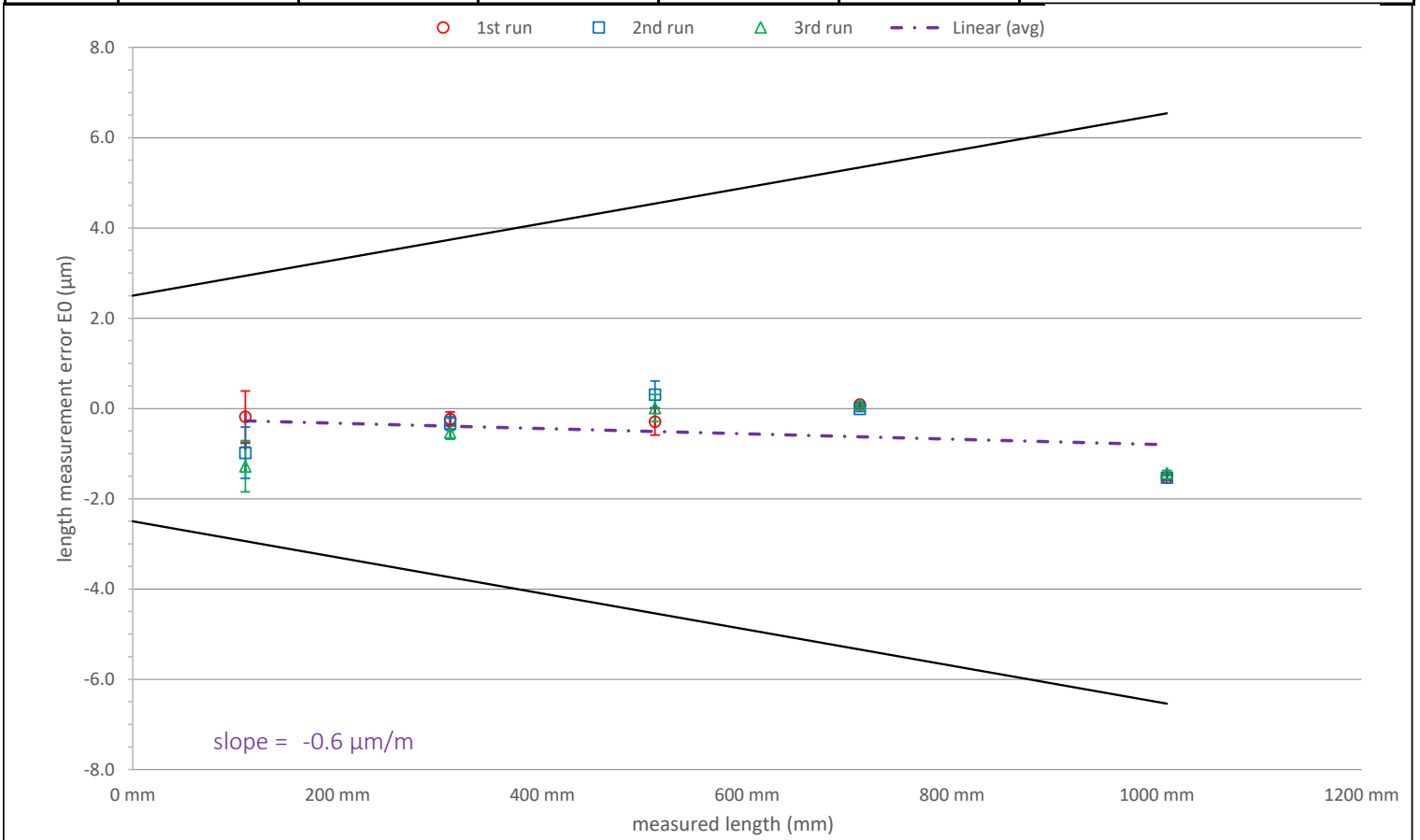
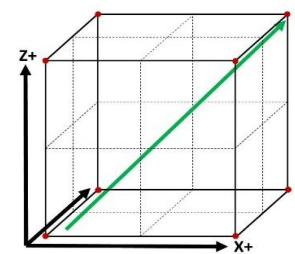
Length:	1	2	3	4	5
	110 mm	310 mm	510 mm	710 mm	1010 mm
Run 1	-1.7	-2.8	-3.5	-3.8	-2.1
Run 2	-2.4	-1.4	-2.9	-2.8	-1.4
Run 3	-2.0	-2.0	-3.1	-4.3	-2.5
Repeatability	0.7	1.4	0.6	1.5	1.1




 www.measure911.com	SPACE DIAGONAL - POS. 4: MAX LENGTH = 2773mm		302 E. Main St., East Dundee, IL 60118 (847) 851-1160
	MPE(E0): $\pm 2.5 + (L / 250)$	MPE(P): 2.0 μ m	Completion date: 2/14/2023
<i>L - represents the measurement length in mm</i>			
Material Standard of Size: 0-1010mm Step Gage			

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Length:	1	2	3	4	5
	110 mm	310 mm	510 mm	710 mm	1010 mm
Run 1	-0.2	-0.2	-0.3	0.1	-1.5
Run 2	-1.0	-0.3	0.3	0.0	-1.5
Run 3	-1.3	-0.5	0.0	0.1	-1.4
Repeatability	1.1	0.3	0.6	0.1	0.1

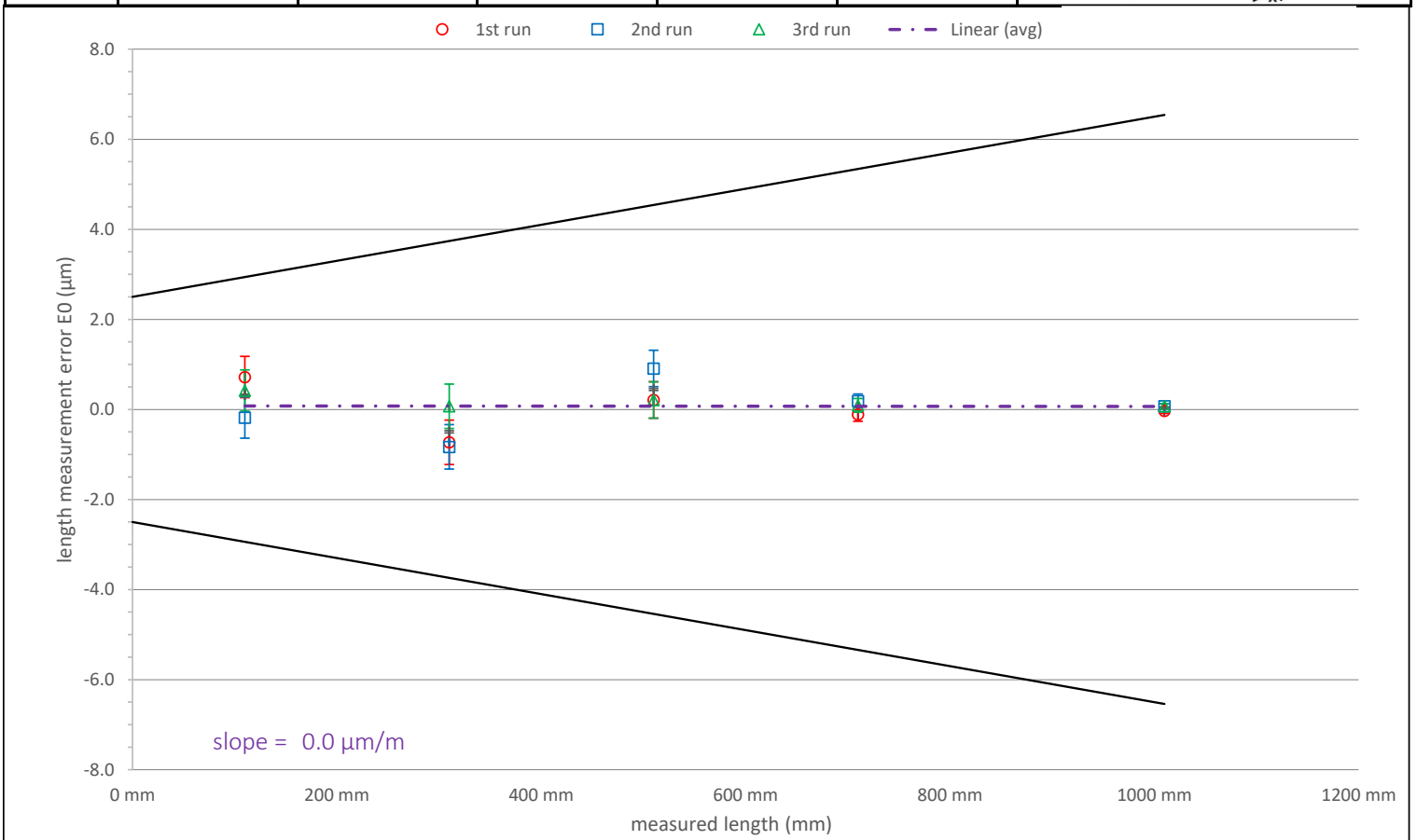
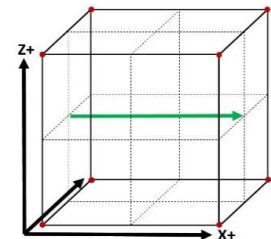



Approved by Sven Bley; 7/11/2014

 <p>www.measure911.com</p>	<p>X-AXIS - POS. 5: Travel = 1500mm</p>		<p>302 E. Main St., East Dundee, IL 60118 (847) 851-1160</p>
	<p>MPE(E0): ± 2.5 + (L / 250)</p>	<p>MPE(P): 2.0µm</p>	<p>Completion date: 2/14/2023</p>
<p><i>L - represents the measurement length in mm</i></p>			
<p>Material Standard of Size: 0-1010mm Step Gage</p>			

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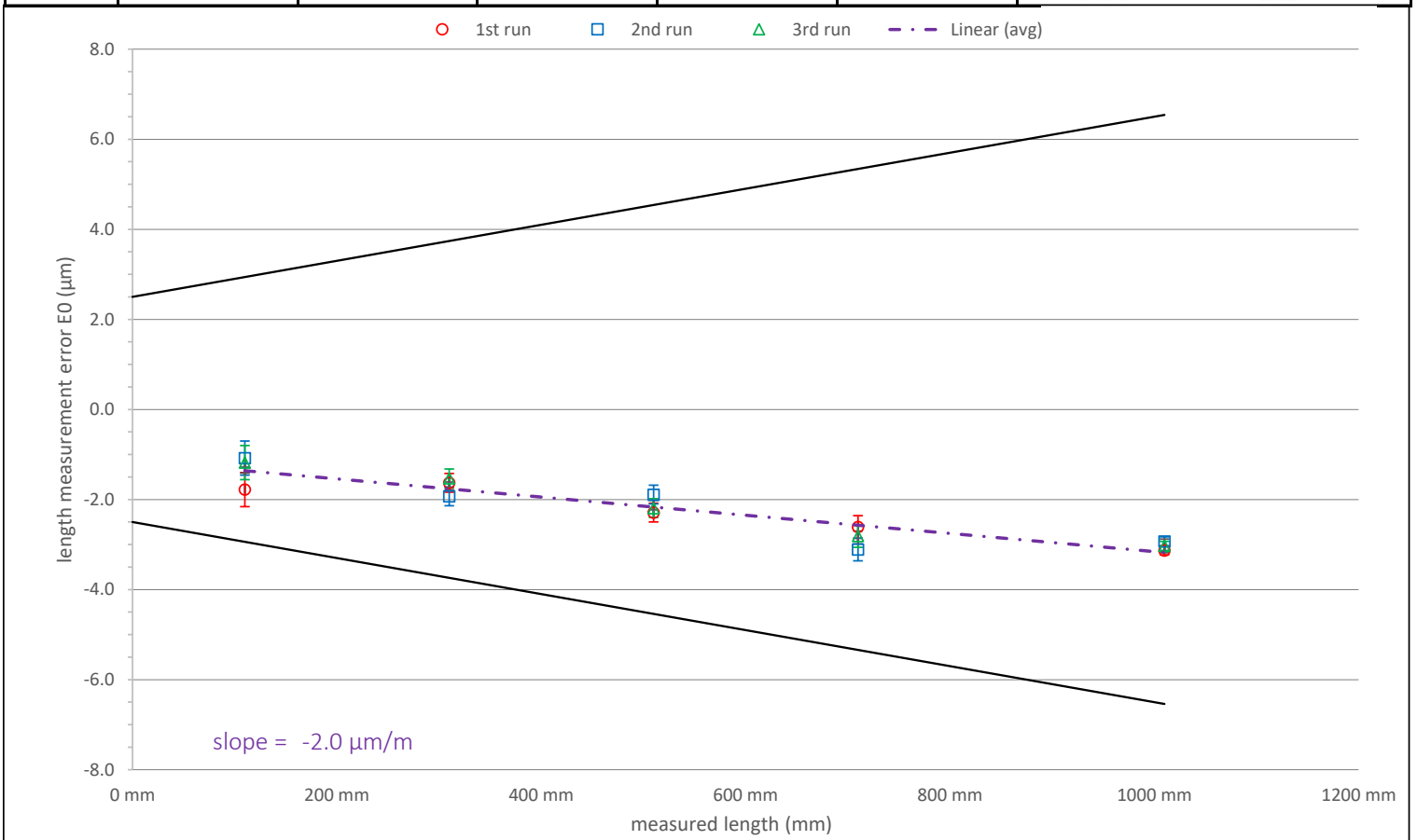
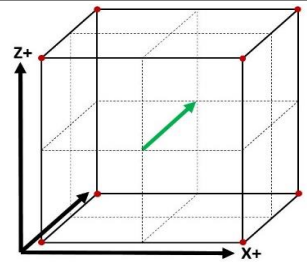
Length:	1	2	3	4	5
	110 mm	310 mm	510 mm	710 mm	1010 mm
Run 1	0.7	-0.7	0.2	-0.1	0.0
Run 2	-0.2	-0.8	0.9	0.2	0.1
Run 3	0.4	0.1	0.2	0.1	0.1
Repeatability	0.9	0.9	0.7	0.3	0.1




 www.measure911.com	Y-AXIS - POS. 6: Travel = 2000mm		302 E. Main St., East Dundee, IL 60118 (847) 851-1160
	MPE(E0): $\pm 2.5 + (L / 250)$	MPE(P): 2.0 μ m	Completion date: 2/14/2023
<i>L - represents the measurement length in mm</i>			
Material Standard of Size: 0-1010mm Step Gage			

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Length:	1	2	3	4	5
	110 mm	310 mm	510 mm	710 mm	1010 mm
Run 1	-1.8	-1.6	-2.3	-2.6	-3.1
Run 2	-1.1	-1.9	-1.9	-3.1	-2.9
Run 3	-1.2	-1.5	-2.2	-2.8	-3.0
Repeatability	0.7	0.4	0.4	0.5	0.2



 <p>www.measure911.com</p>	<p>Z-AXIS - POS. 7: Travel = 1200mm</p>		<p>302 E. Main St., East Dundee, IL 60118 (847) 851-1160</p>
	<p>MPE(E0): ± 2.5 + (L / 250)</p>	<p>MPE(P): 2.0µm</p>	<p>Completion date: 2/14/2023</p>
<p><i>L - represents the measurement length in mm</i></p>			
<p>Material Standard of Size: 0-610mm Step Gage</p>			

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Length:	1	2	3	4	5
	110 mm	210 mm	310 mm	410 mm	610 mm
Run 1	-0.8	-1.4	-2.0	-1.2	-1.3
Run 2	-0.7	-1.4	-1.3	-1.4	-1.1
Run 3	-0.9	-1.1	-1.5	-2.1	-0.7
Repeatability	0.2	0.3	0.7	0.9	0.6

