Results of 2024: Key Elements for Future Metrology at IMT

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1) Standardized Flow
See *MSE Day* Poster
Richard Thelen

2) Guided Dialogue (.xls Model)
to convert research question
into metrology process flow

partially interactive

Extracted from "*Request Sheet.xls*"

3) VALUES		
Category	Sub	
Total sample dimension[µm]	x	5000
	y	2500
	z	10
Sample Weight [g]		72
Sample Specs [µm]	flat	11
	wavy	0
	warped	0
Critical Dimensions [µm]	x	5

Limitations: Resolution, File Size, Time, max. Slope, FoV, etc.

2) SELECTIONS	
Measurement Confidence	Systematic
Visualization	3D Surface
Position	Arbitrarily
Sample Apperance	Clean
Pattern Visibility	naked Eye

1) DETERMINATIONS	
Time Stamp	18.07.2024 17:22
Trivial Name	Spot Array
Use Case	Test1
Customer	secret
KNMF-Nr	031-079-558742
PIN	rnqdsi1561_7765
Predecessor	deq2290-14-zqt7
String Name Structure	IMT AFM RT 24.07.21
Storage path	q/knmfi/2024/Projects/

3* 1 2

*Device & Mode selected: Via Boolean Operations, simplified Models, Calculations and Visualization

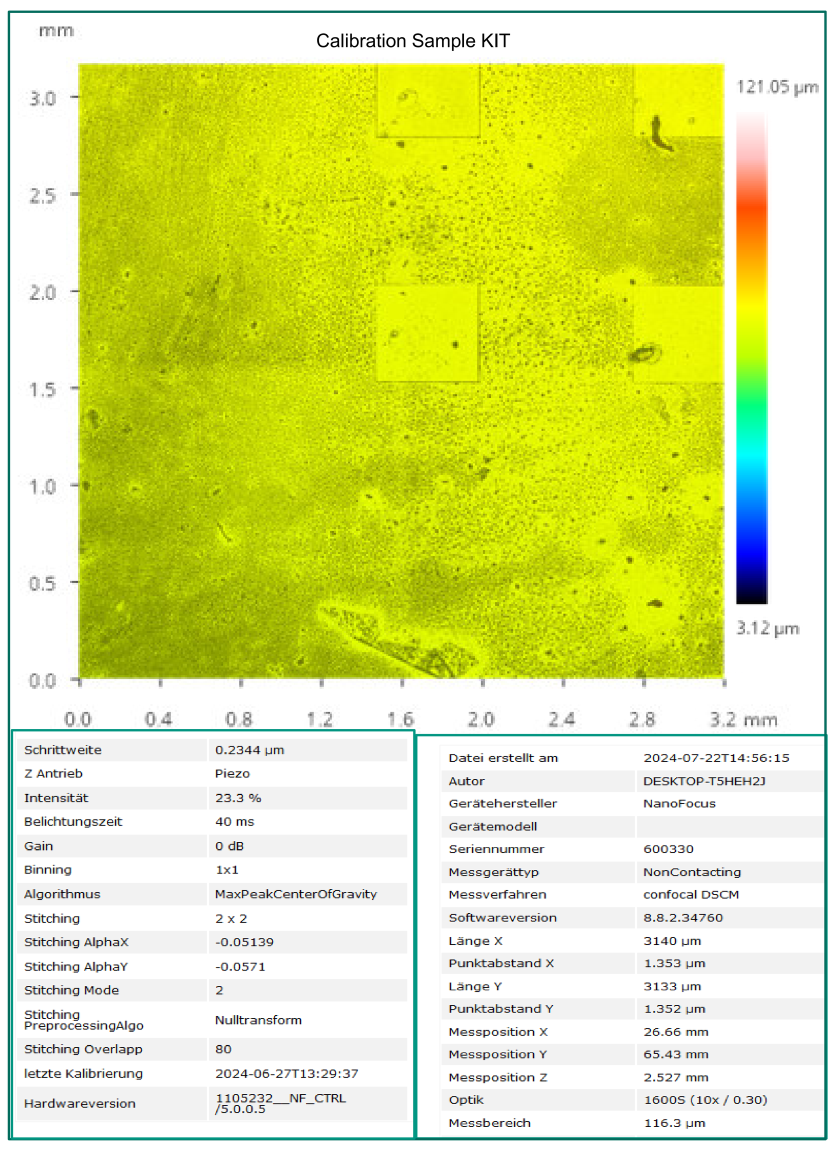
DEVICE SELECTION

3) Python Script
to extract and convert
metadata for ELN use

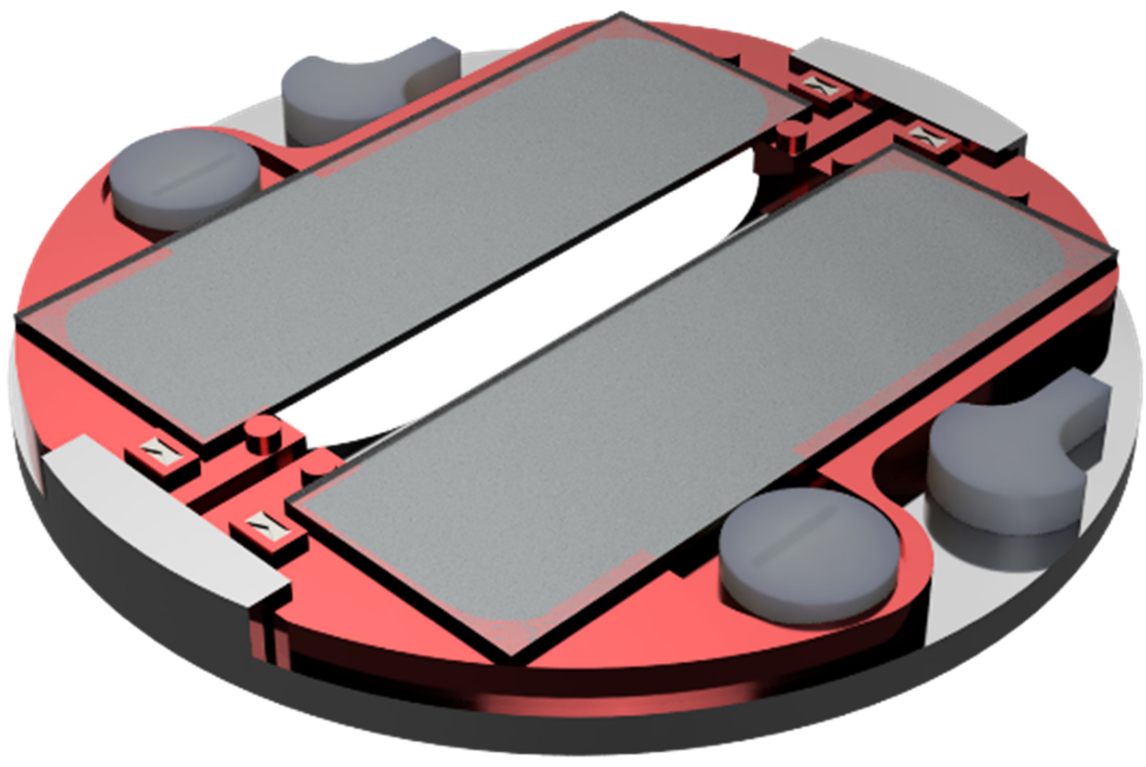
METADATA Conversion

	To ELN	To EXCEL	From Python	To Mountains	To Python	From Device	
	Standardized Script			Individual			
	.JSON	.XLS	.CSV	.spm	.spm	.spm	AFM
				.obd	.xml	.obdx	VSI
				.fits	.html	.fits	CSM
							XYZ
		tbd	Coding: R. Kietz			.czi	SEM/OM

4) Standardized + scaled Preview ➔ picture search.
NO search by key words



5) 3D Printed Carrier
compensates theta,
tip and tilt, manually



6) 3D Vector Alignment
See *MSE Day* Poster
Max Kabbe

Future MDMC Metrology Topics at IMT

Sample Navigation System

Human-machine communication and optimized algorithms for quality improvement in high-precision measurement processes using animated navigation to define measurement points on a sample surface

The devices will perform with best possible compensation using integrated machine learning. The necessary multi-parameter optimization will be supported by AI to determine the best path and convert it into a machine-readable form. This concerns the design of the mechanical interface and the actuators as well as the determination of the method for the best possible compensation.

Motorized Carrier

Universal and compact carrier with integrated mechanics for converting position data into correction values in the event of position deviation over several degrees of freedom.

The device-independent carrier with active compensation of position deviations offers a universal solution to the problem of lacking alignment options. Without requiring access to the often proprietary manufacturer software or further investment in improving the individual device stages for additional degrees of freedom DoF.

Collaboration Opportunities

Institute of Microstructure Technology