We Deliver Innovations That Matter

VERSIA - Product Presentation

Our Capabilities

Novanta | Precision Manufacturing

Novanta | Robotics & Automation

Novanta | Advanced Surgery

Novanta | Precision Medicine

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Novanta | PRECISION
MANUFACTURING
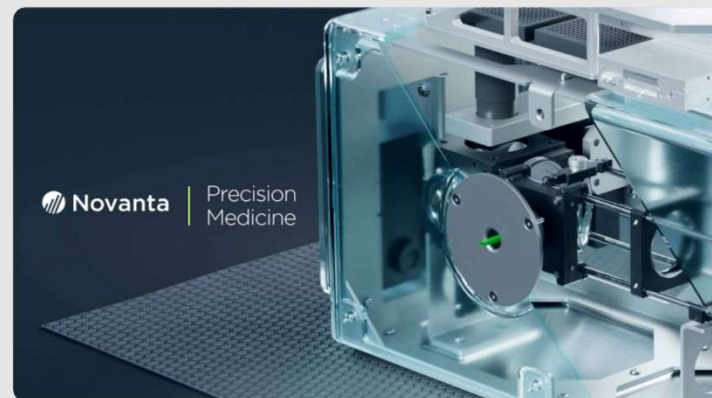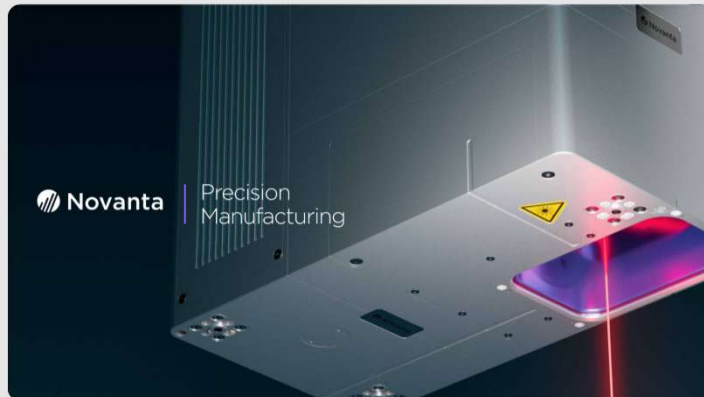
Advanced laser and beam steering technologies
for process and system integration.

Galvanometer Beam Scanners

- Class leading speed & accuracy
- Patented mirror technology
- UV – VIS - IR

Ultra High Speed Beam Scanners

- Resonant & polygon options
- Up to 50k RPM (polygonal)
- Up to 12 KHz (resonant)
- UV – VIS - IR

Enclosed Scanheads

- 2 & 3 axis
- Digital & analog
- Onboard control
- >1kW power handling

Laser Sources

- DPSS / CO2 / Diode / Ultrafast
- Fully industrialized designs
- Intelligent power handling
- Comprehensive SDK

Complete Subsystems

- Integrated laser & beam delivery
- Factory calibrated
- Unified control architecture
- Full customisation

Novanta 2D Scanner Family

Agenda

- ❓ What is VERSIA?

- ✔ VERSIA Design Features

- 📋 Advanced Software

- ✕ General Specification

- 📊 Tune Specification

- ⇄ Application results

- ⚖ Reliability

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Meet VERSIA

2-AXIS HYBRID SCAN HEAD

- Technology
  - ✓ Digital Servo: Marconi Platform
  - ✓ Analog Galvo: 8331KM Type
- Superior Thermal Management
- Mirror: 14mm Silicon Mirror
  - ✓ UV: 341-357nm
  - ✓ Green: 513-534nm
  - ✓ Fiber: 1020-1090nm
  - ✓ CO2: 9.3-10.6
- Applications:
  - ✓ Micromachining (e.g., Solar, OLED)
  - ✓ Marking & Coding
 - ✓ Laser Additive Manufacturing (LAM)

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VERSIA Design Features

- Compact industrial design reduces system footprint
  - ✓ Dimensions: 99 mm x 99 mm x 132.20 mm
  - ✓ Weight 2.12 kg

- Integration flexibility
  - ✓ Two configuration: Side I/O & Top I/O
  - ✓ Threaded input aperture (SM1) for more flexibility & customizability

- It supports industry standard interface XY2-100 with a single DB25 connector as well as Novanta's NVL-100
  - ✓ SL2100 Compatible (limited)

- Bi-directional communication enables Position Feedback Monitoring

- Ability to carry multi-tune where each tune is optimized for the specific applications

- Sky Writing Capability & ScanPack

- Integrated monolithic water-cooling design

- Dynamically matched mirror design improves system performance

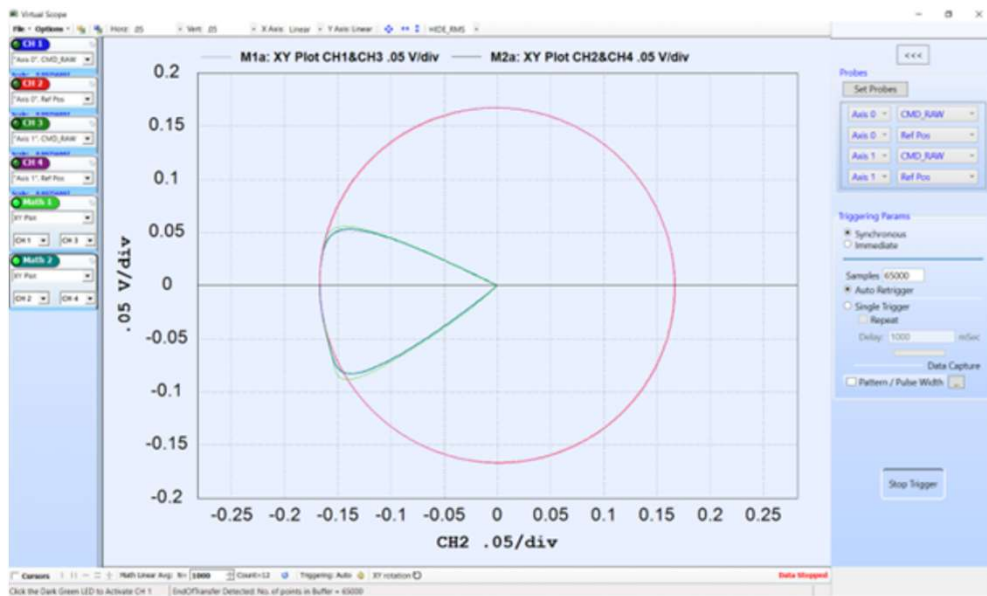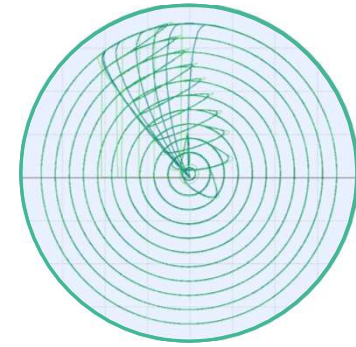Novanta

Performance Monitoring

To enable users to monitor position feedback and other critical parameters, VERSIA is engineered with a new bi-directional communication protocol, NVL-100.
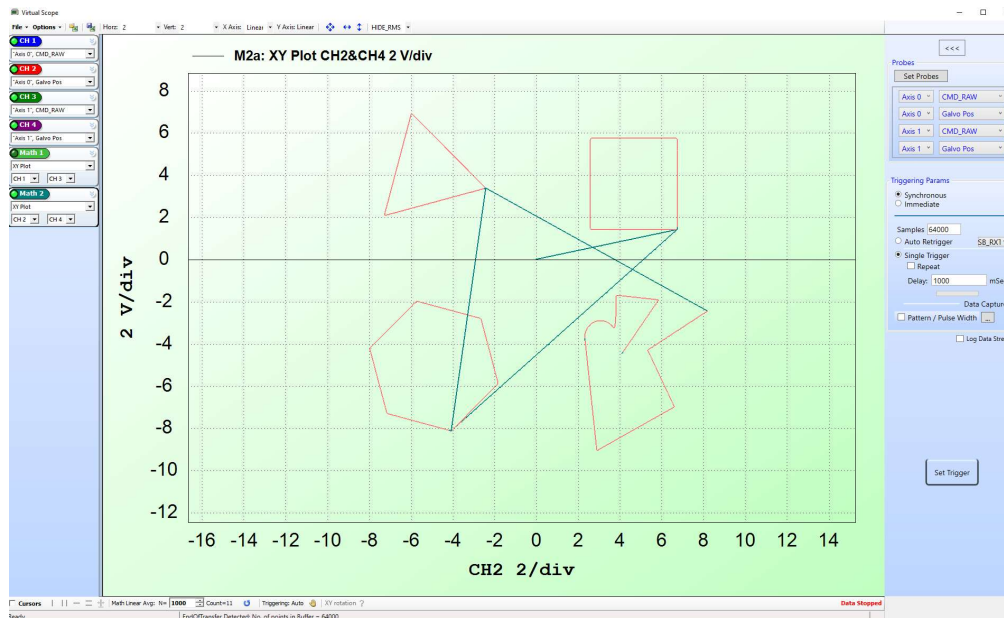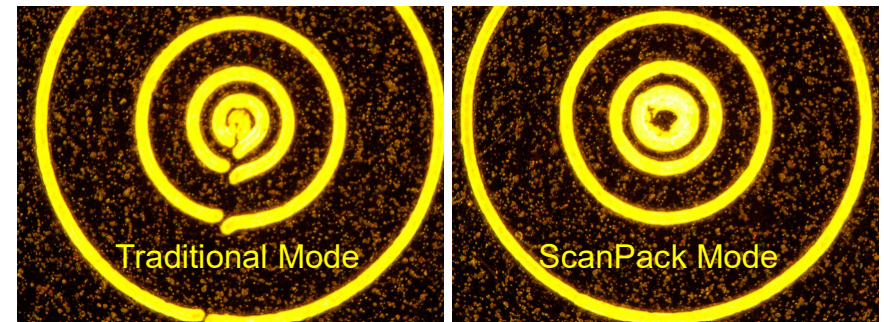

Real Time Feedback monitoring for four probes simultaneously via TM Lite.
Available via API
Galvo Position
Galvo Current
Galvo ….

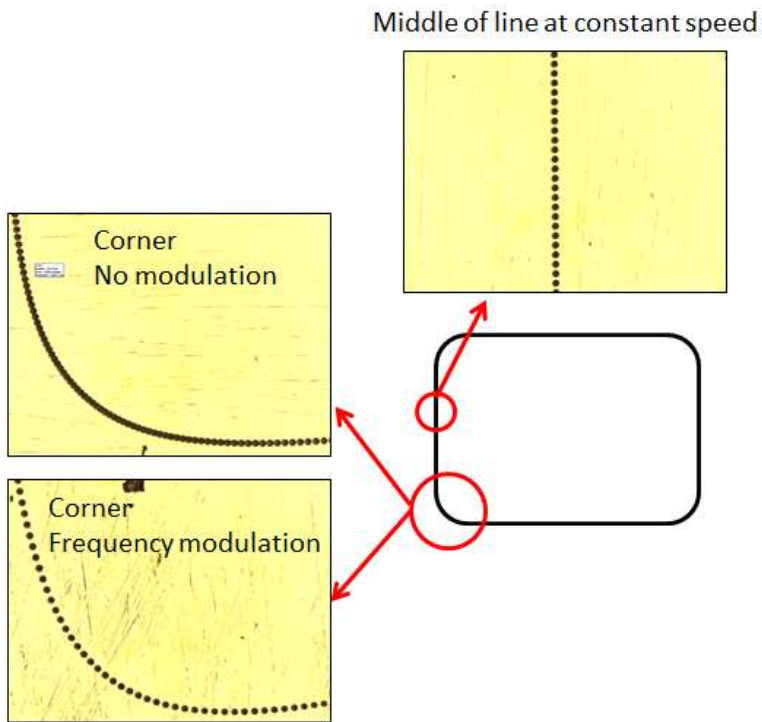Novanta

Advanced Software ScanPack

ScanPack functionality now available for VERSIA. It plans and optimizes the scanner moving trajectory based on the scanning-system capability as well as the user's accuracy requirements.
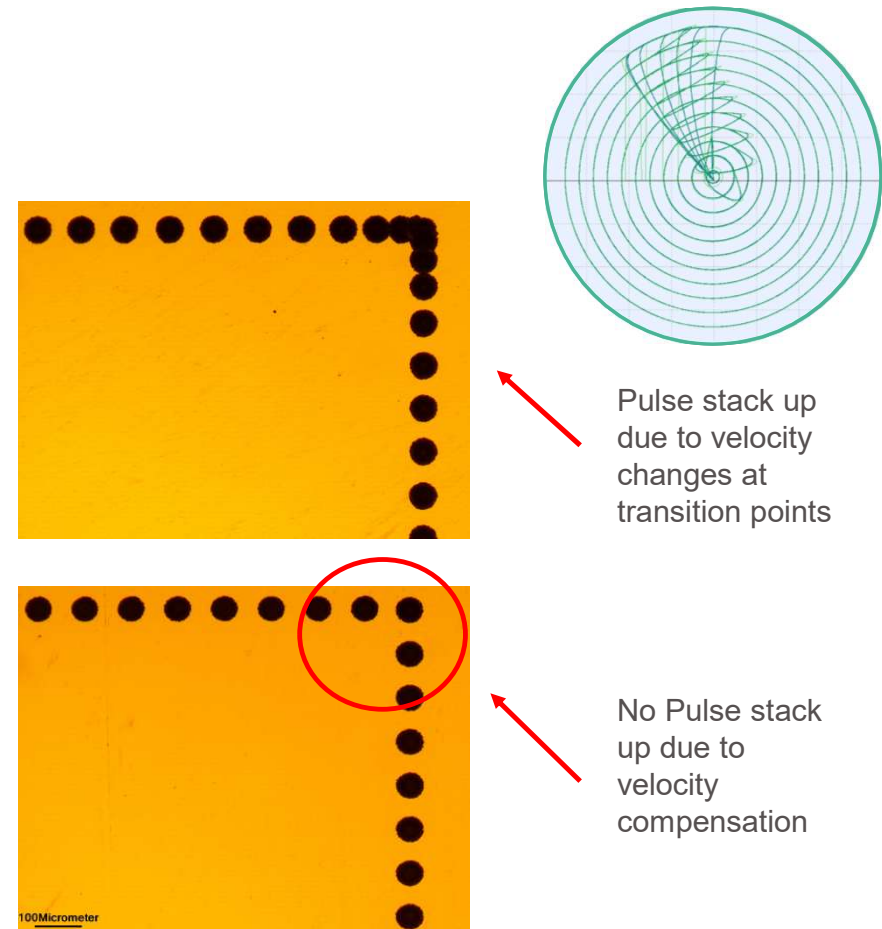

Example:
ScanPack enables high precision small circle scanning.


Traditional Mode   ScanPack Mode

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Advanced Software ScanPack

Middle of line at constant speed

Corner No modulation

Corner Frequency modulation

Velocity Laser Modulation

Pulse stack up due to velocity changes at transition points

No Pulse stack up due to velocity compensation

Constant Vector Velocity

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# Advanced Software Scan-Pack Spirals

- Predictive trajectory planning

- Eliminate the need for delay parameters

- Increases throughput
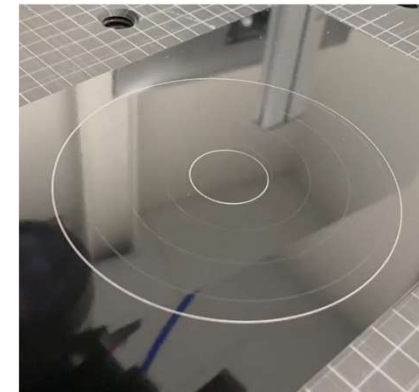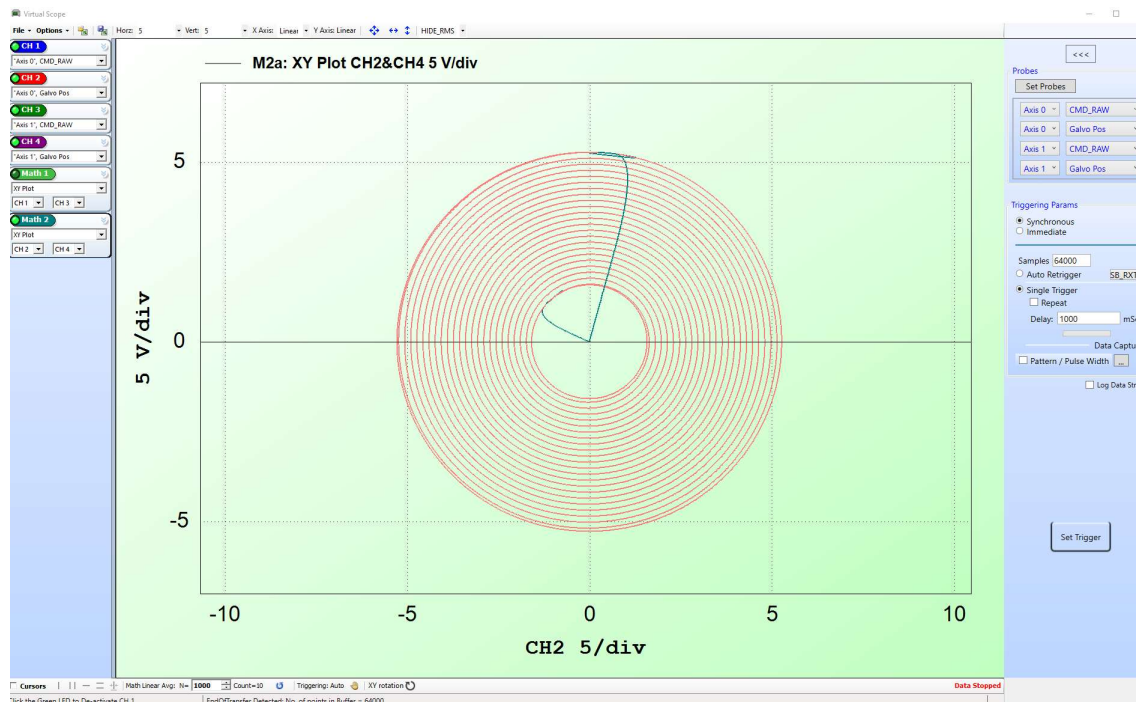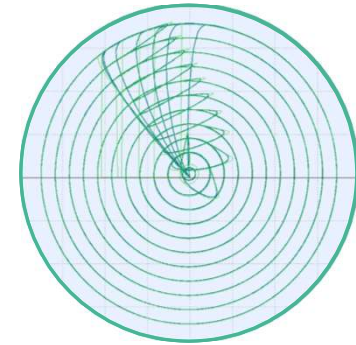
TuneMaster Lite app showing an optimized scanner path calculation to generate perfect spiral. The path calculations take galvo and servo limitations into consideration.

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Advanced Software SyncMaster

SyncMaster, now available with VERSIA, is a control-based mode of operation that permits seamless non-stop scanning of a job that exceeds the field of view of a single scan head.
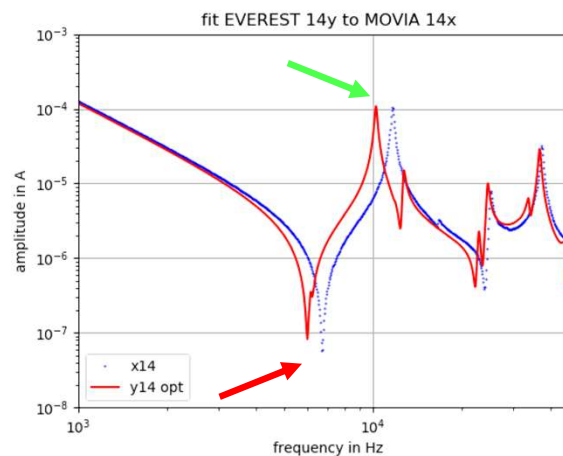
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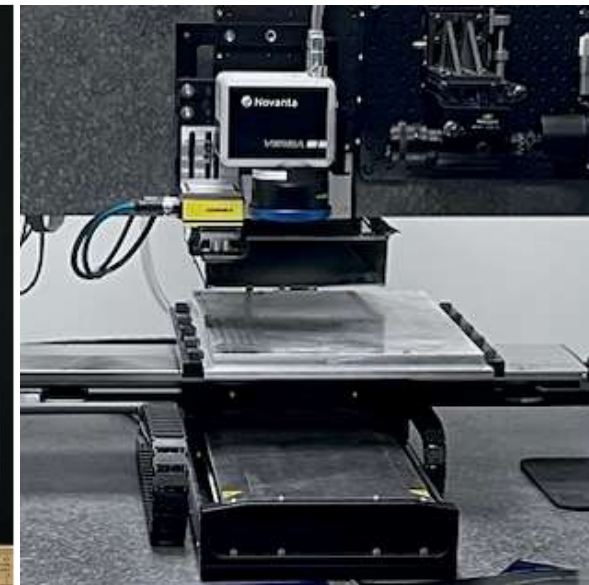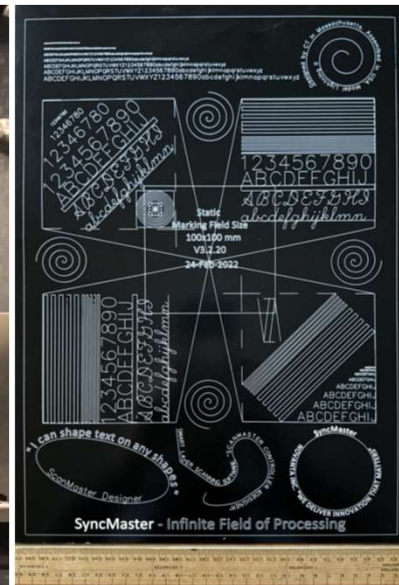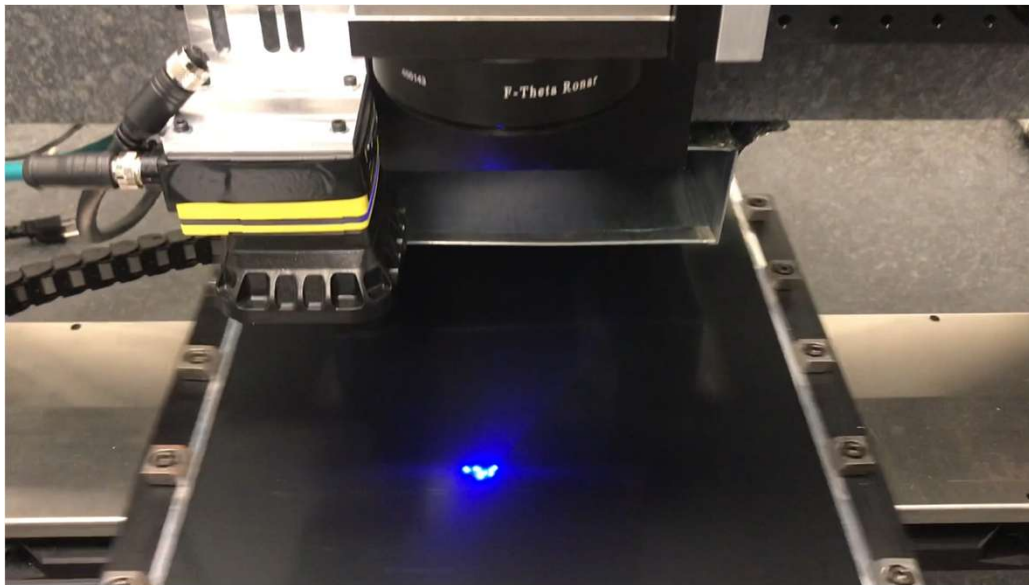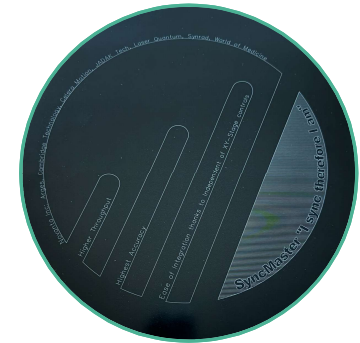
Dynamically Matched Mirrors

- Matching anti resonance and resonance by changing
  - ✓ Mirror thickness and chamfer
  - ✓ Mount geometry

- Approx. 250 simulations performed by optimization algorithm while reducing normalized RMS error
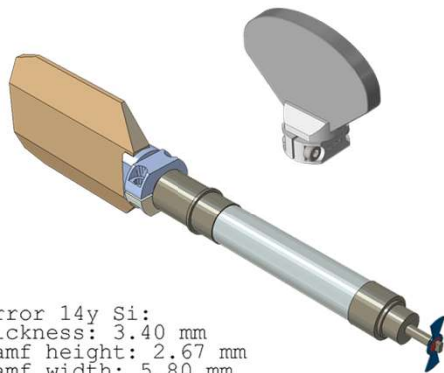

```
Mirror 14y Si:
thickness: 3.40 mm
chamf height: 2.67 mm
chamf width: 5.80 mm
fase length: 5.65 mm
Ixx = 1.183e-07 kg*m^2
mass = 4.501e+00 g
cog = 1.500e+00 mm
```


fit EVEREST 14y to MOVIA 14x

- x14
- y14 opt

amplitude in A

frequency in Hz

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Technical Specifications

Mirror Aperture Size	14 mm
Tune Type	Performance High-Speed
Repeatability	<2 µrad
Wavelength Options | Max Power	UV: 341 - 357 nm | check with factory Green: 513-534 nm | check with factory Fiber: 1020 - 1090 nm | 500 W CO2: 9.2 - 10.6 µm | 400 W
Long Term Offset Drift	<25 µrad
Long Term Scale Drift	<40 ppm
Temperature Offset Drift	<10 µrad/°C
Temperature Scale Drift	<10 ppm/°C
Command Resolution	16 bit for XY2-100 20 bit for NVL-100
Communication Interface	XY2 – 100 NVL-100
Power Requirements	48V, 5A RMS
Operating Temperature	15 °C - 40 °C
IP Rating	IP 54
Weight (approximate)	2.12 kg
Dimensions (L x W x H)	99 mm x 99 mm x 132.20 mm

Notes:
All angles are in optical degrees, unless otherwise noted. All specifications are subject to change without notice.

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Tune Specification

Tune Parameters	Specification
Tune Type	Performance
Scan Angle (optical)	±21°
Step Response Time 1% of Full Scale[1]	<400 µs
Max Speed	160 rad/s
Tracking Error	<230 µs

Tune Parameters	Specification
Tune Type	High-speed
Scan Angle (optical)	±21°
Step Response Time 1% of Full Scale[1]	<600 µs
Max Speed	250 rad/s
Tracking Error	<250 µs

Notes:
All angles are in mechanical degrees, unless otherwise noted. All specifications are subject to change without notice.

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Meet VERSIA 20

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Application Testing - OLED

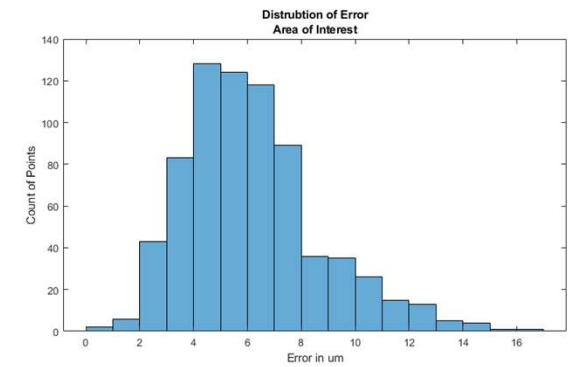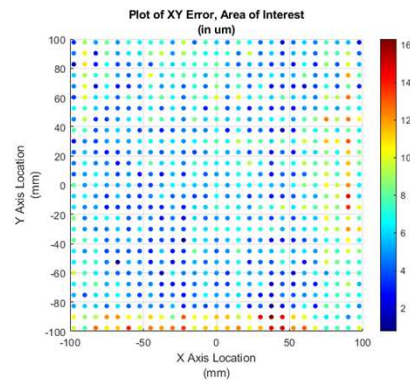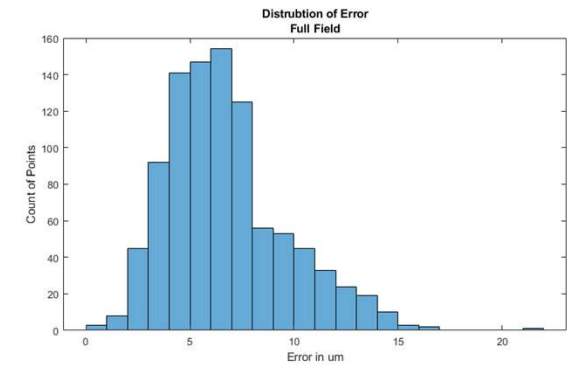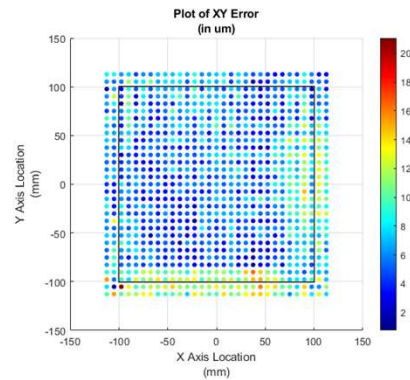Screen Pattern Results

Calibration

Results limited by metrology accuracy

```
MaxXYErrorumofField = 21.0609
MeanXYErrorumofField = 6.7022
MaxXYErrorumofAOI = 16.3049
MeanXYErrorumofAOI = 6.1589
```
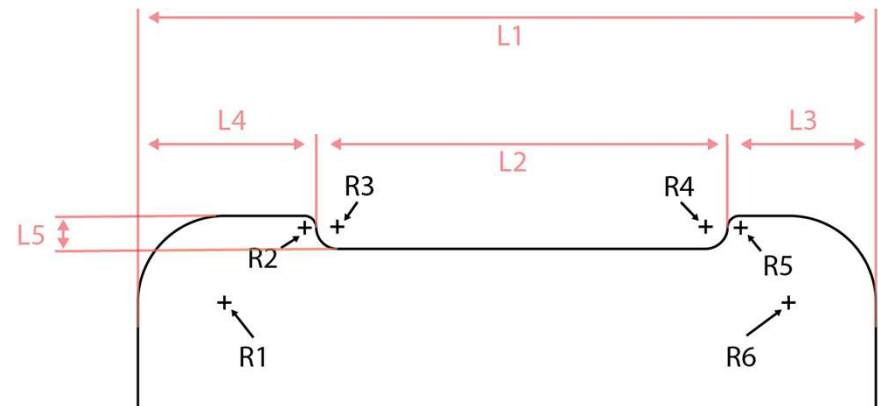
Test Pattern Results

SETUP & METHOD

- F-330 used, non-telecentric

- Mark Speed = 2m/s, Jump Speed = 4m/s

- Spline tool used to measure, so dust and coating uniformity of marking substrate coating thickness plays a roll in the results

Feature	L1	L2	L3	L4	L5
Nominal (mm)	106	65	20.5	20.5	10
Measured (mm)	105.98	64.99	20.49	20.50	10.00
Error (um)	12.27	6.89	0.60	5.97	6.17

Feature	R1	R2	R3	R4	R5	R6
Nominal (mm)	12.5	1.7	7	7	1.7	12.5
Max Error (um)	8.1	4.9	8.5	10.1	9	8.9
Mean Error (um)	2.5	0.9	2.9	0.4	1.8	4.9

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Application Testing - Solar

Screen Pattern Results

Calibration

		Results
Full Field	**Max (µm)**	11.2379
	Mean (µm)	3.2853
	Std. Dev (µm)	1.9139
AOI	**Max (µm)**	6.9231
	Mean (µm)	2.4167
	Std. Dev (µm)	1.3993

Distrubtion of Error
Area of Interest



Plot of XY Error, Area of Interest
(in um)
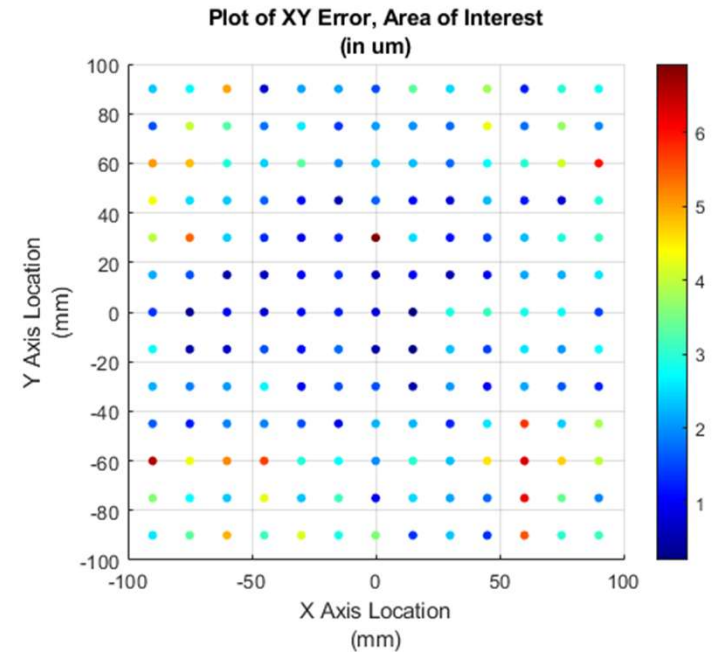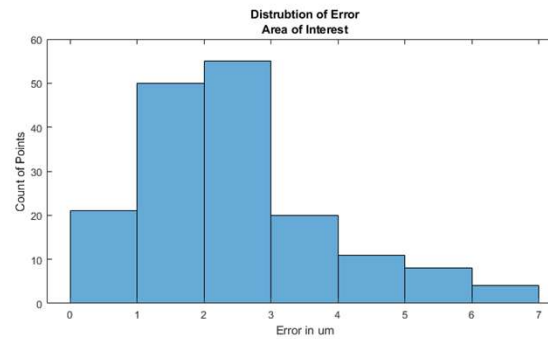
- Calibration method:
  - Physical mode + Bi-linear interpolation
  - Calibration grid: 17 by 17 at 15mm distance
  - Calibration speed: 5000 mm/s at F450 (non-telecentric)

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Test Pattern Results

Setup & Method

- test pattern is a series of 200mm horizontal lines with 1mm spacing

- Pattern is run at 185rad/s Measured in areas boxed in red
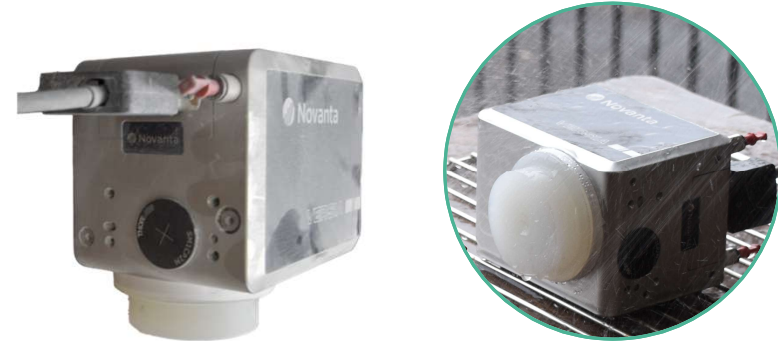
- All units are in Micron

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logo
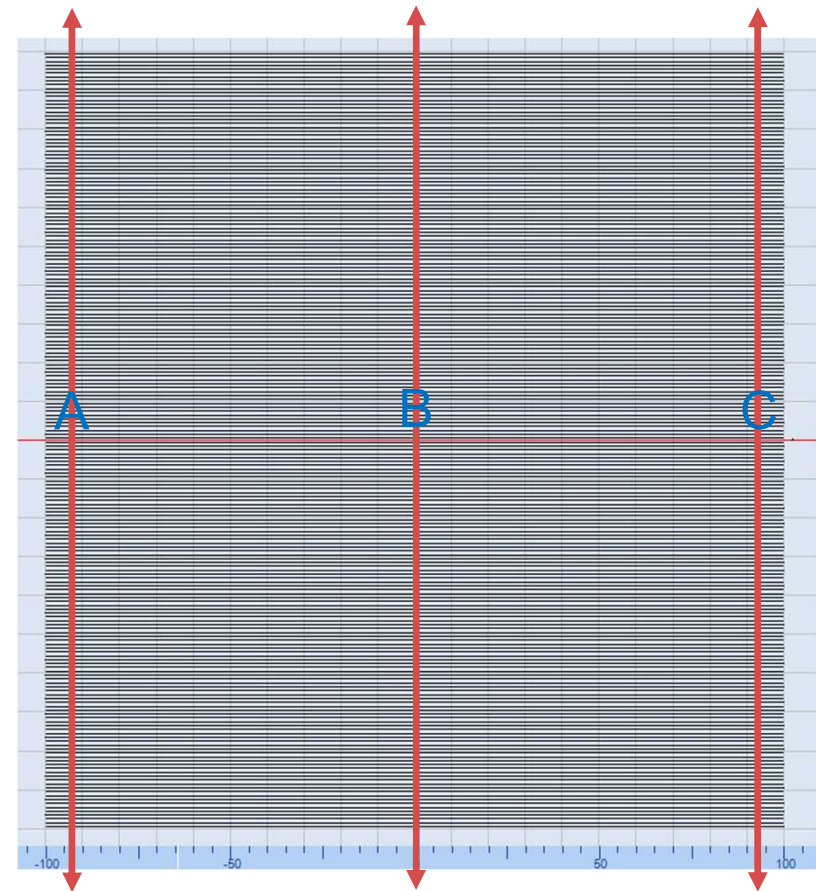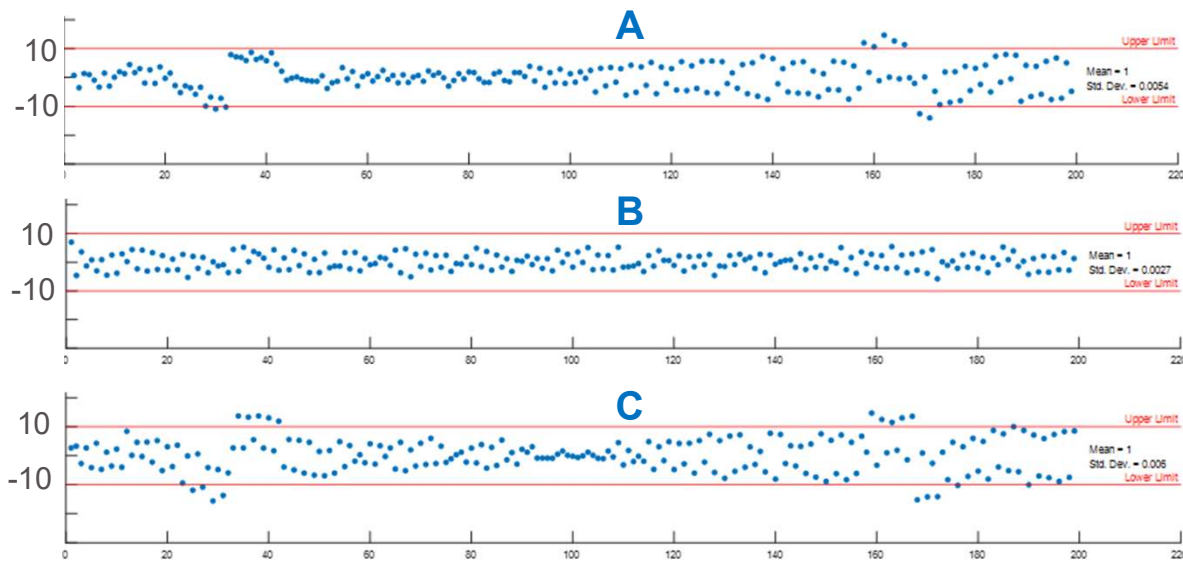
VERSIA is Versatile

Reliability

System Reliability

VERSIA underwent extensive reliability testing to prove its ruggedness. Each manufactured unit goes through an intensive 48h burn-in test.

Environmental Testing:
- MIL-STD-810G Method 502.6 (-33 to 63°C)
- ISTA Procedure 3A 08-09 (-29 to 60°C)
- 4 Scan-head operating high dynamic job with temperature cycling from 15 to 50 ° C
- Scan-head "health" parameters was collected & analyzed periodically during the course experiment for under 1 month

Reliability Testing:
- IP-54 Testing
- Packaging Test
- EMC Test
- Vibration Test

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Thank You

Questions?