WaferTrim™ M350

Active IC Trim System

Company Confidential

GSI™

GSI™ WaferTrim™

The Leading Brand for Laser Trim

Enabling Technology™

GSI Group: *Innovative Trim Solutions for Your Next Application*

- ✓ Laser Trimming of electronic circuits, components, and ICs.
- ✓ Over 25 years of trimming experience.
- ✓ Production proven, with over 2000 systems installed worldwide.

WaferTrim™ M350

Thin Film Wafer Laser Trimmer

WaferTrim™ M350

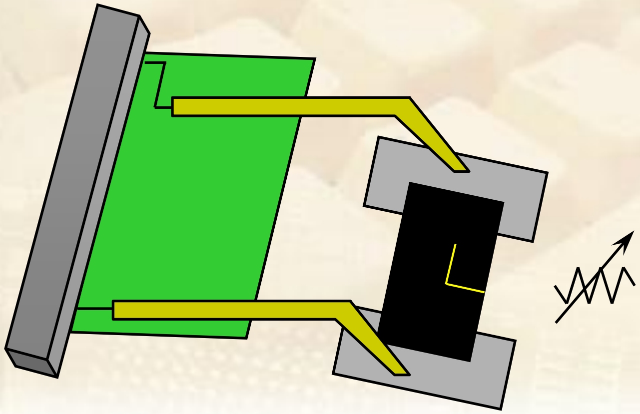
- ✓ The ideal solution for high speed adjustment of thin film resistors for resistive arrays or active trims at the wafer level.
- ✓ Windows 2000 operating system environment provides efficient networking platform and ease of use.

M350 – Active wafer level optimization of precision linear and mixed-signal devices**.**

- Provides active trim through integration of laser micro-machining, probing, and test.
- Superior laser control ensures process consistency & highest yields.
- Precise wafer alignment via Cognex® pattern recognition.
- WaferTrim software for rapid development of trim applications.
- Seamless integration to today's ATEs via Enhanced Tester Interface.

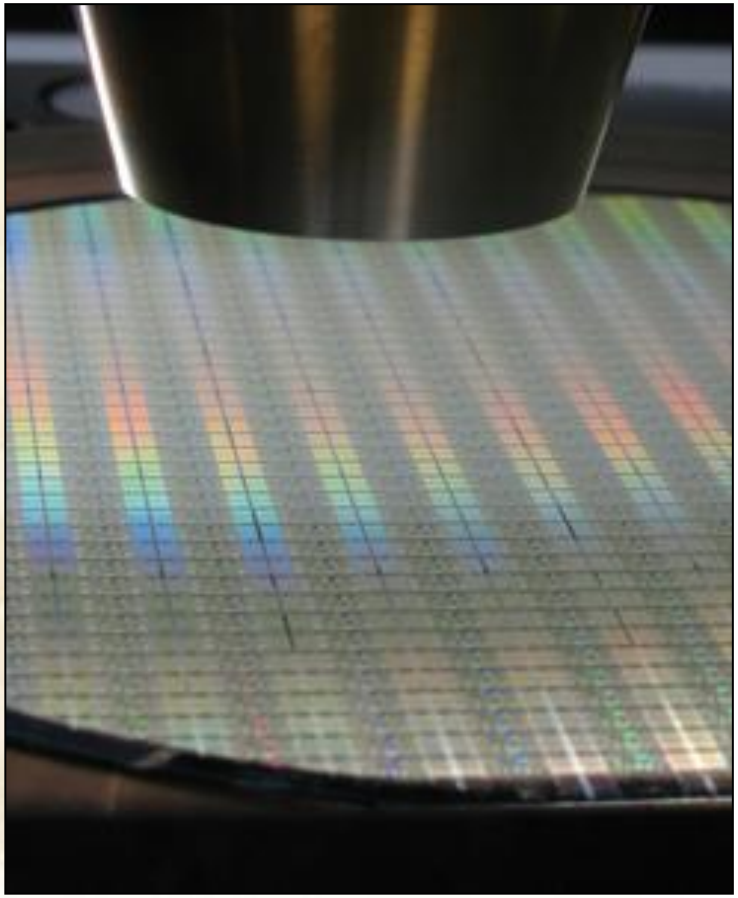
What is Laser Trim?

- ✓ A safe, highly accurate micro-machining technique that can be used to fine-tune electronic circuits, components, and ICs to achieve specific performance goals.



Why Trim ICs?

- ✓ Shrink die size
- ✓ Reduce costs
- ✓ Increase accuracy
- ✓ Increase functionality
- ✓ Reduce time to market



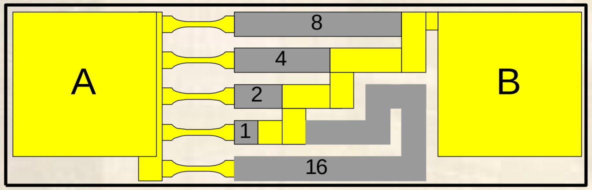
Advantages of Laser IC Trim

- ✓ Electrical connection to fuse or link not needed.
- ✓ Fewer pads require less real estate.
- ✓ PROM requires multiple technology and die real estate.
- ✓ Provides fine adjustments of resistors.
- ✓ Proven technology.
- ✓ Hundreds of systems running daily worldwide.

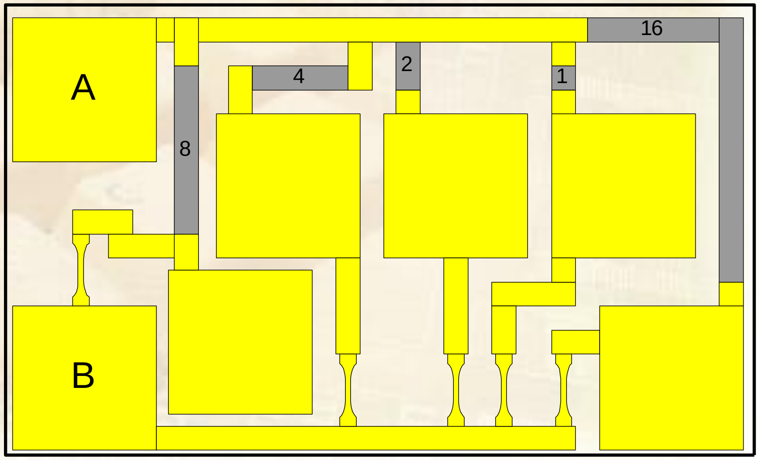
Laser vs Current to Open Fuses

- ✓ Design for laser trim, and the savings in real estate can be huge:

Five links positioned for laser trim



Five links with probe pads for fusing



The Laser Edge

- ✓ Laser is not good at directly trimming . . .

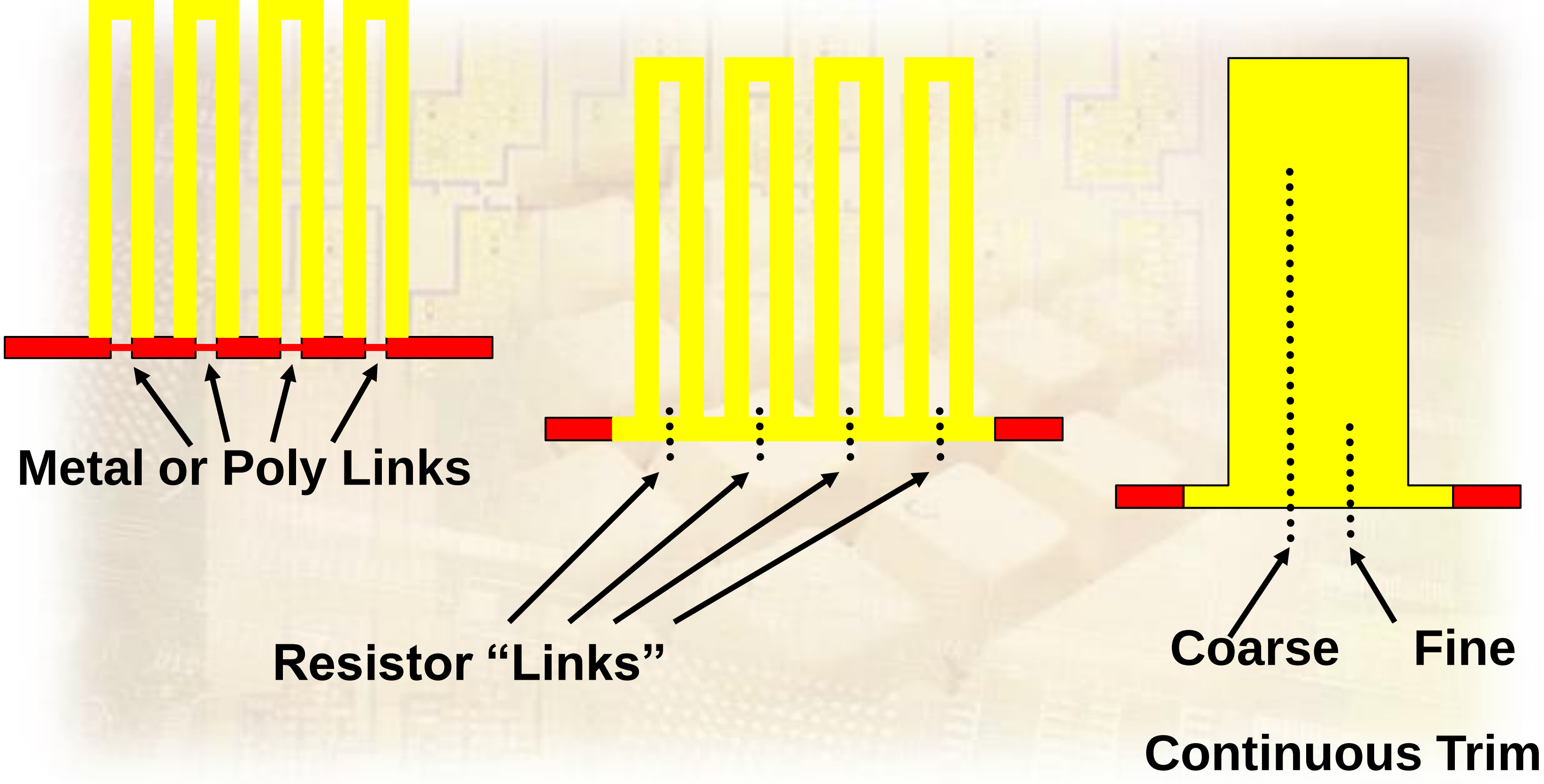
  Capacitors and inductors

- ✓ Instead . . .

  Design the circuit resistors or links to have the same circuit effect

The Laser Edge

Use a laser for . . .



Metal or Poly Links

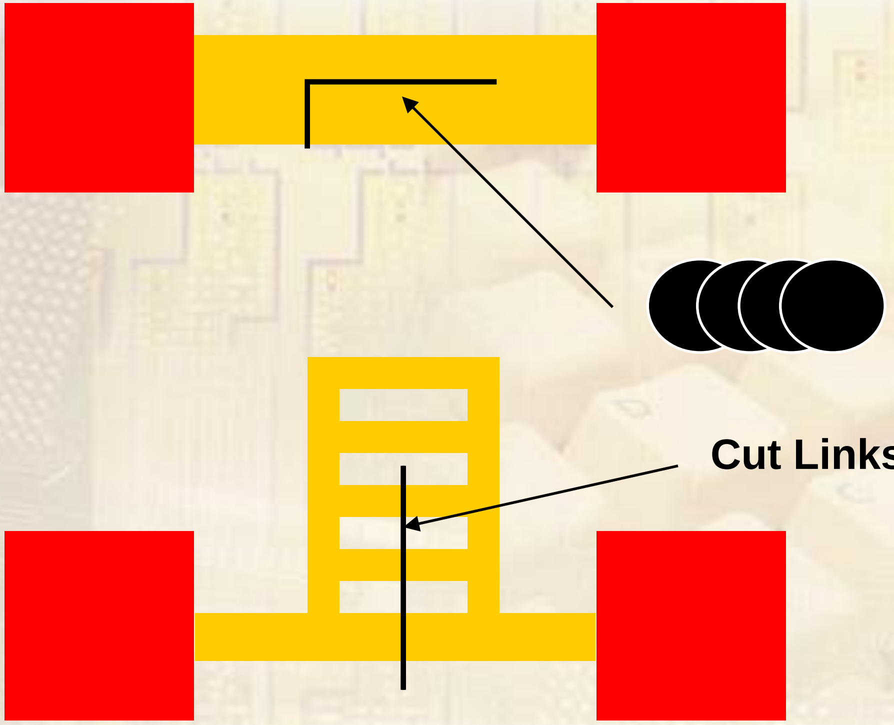
Resistor "Links"

Coarse **Fine**

Continuous Trim

Or any combination of these

Types of Resistor Trimming



L-Cut (Analog) Trimming

Cut Links

Thin Film Link Cut
(Digital) Trimming

What Happens When Resistors Are Trimmed?

Either: ***Material is evaporated at very high power***

____________*Example: Tantalum Nitride and Polysilicon*

or

Resistor material is oxidized In the presence of silicon dioxide

____________*Example: Sichrome and Nichrome*

or

"Island" structure is changed in very thin films

____________*Example: Sichrome*

End result is increase of resistance while trimming

Laser Trimming Requirements

- ✓ *Small spot size*
- ✓ *High positioning accuracy*
- ✓ *Trim without damage to substrate, devices and passivation*
- ✓ *Minimal change in resistor characteristics*
  - TCR
  - Drift and stability
  - Power carrying capability

The *NEW* *WaferTrim M350*
Active IC Trim Platform

- ✓ Smaller spot sizes.
- ✓ Higher throughput.
- ✓ Higher precision.
- ✓ Easier to integrate, program, and use.

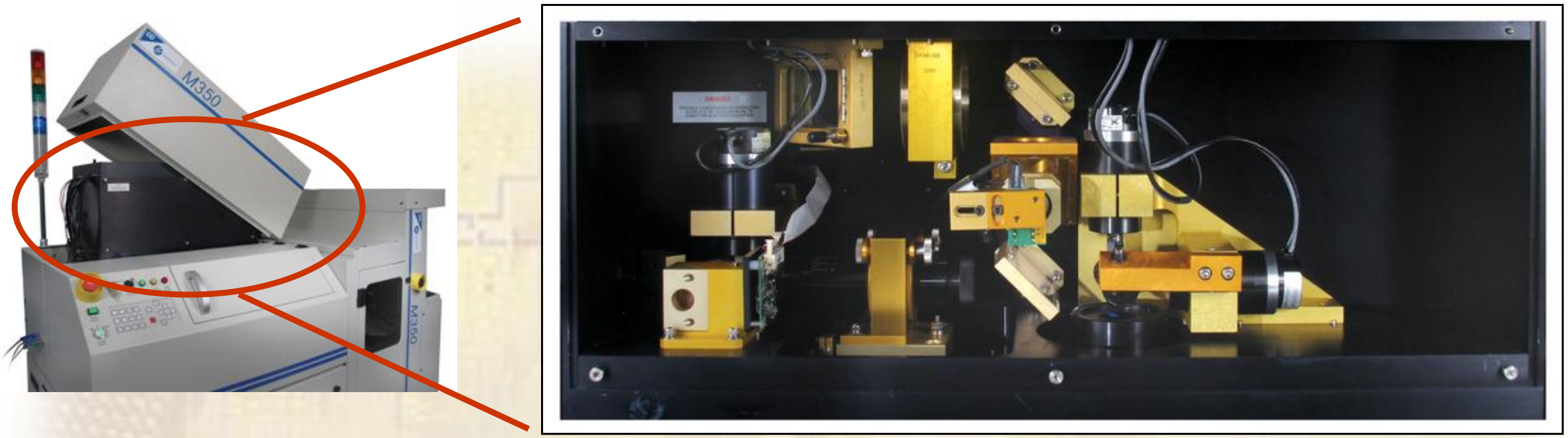
WaferTrim M350 Advantages

- ✓ Next generation of proven technology.
- ✓ Fully integrated test and trim solution with seamless integration to today’s ATEs.
- ✓ Proven superior laser control ensures process consistency & highest yields.
- ✓ Dramatically improved positioning and alignment capability.
- ✓ New user-friendly software improves efficiency and provides compatibility with existing M310 data setup files.

M350 Design Advancements

- ✓ 14mm field size
- ✓ Choice of 6.5μm or 5μm spot size configurations
- ✓ +/-4μm probe to pad alignment
- ✓ Dual magnification probe pin viewing
- ✓ <=1μm beam positioning accuracy
- ✓ Closed loop XYZ-theta stages with +/-2μm accuracy and sub-micron repeatability
- ✓ Isolated Frame for Greater Process Stability
- ✓ Higher throughput U move performance
- ✓ Improved Z-axis motorized probe frame
- ✓ Heavy duty 8” chuck assembly handles higher probe forces
- ✓ Improved system thermal management and monitoring
- ✓ Windows 2000 software platform
- ✓ Compatibility to Ctrims and LIserver data/setup files

Beam Box Improvements



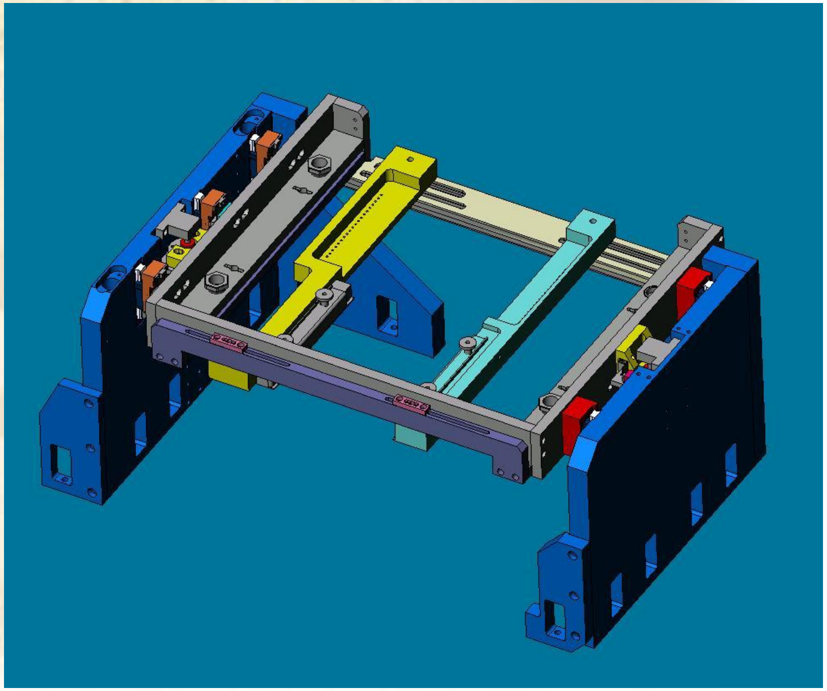
- ✓ Programmable/controllable viewing illumination.
- ✓ New beam controller electronics
- ✓ 5µ Spot Size Option

Chuck Assembly & Motion System

- ✓ New Stiffer Design
- ✓ Closed-loop, high-accuracy, servo-driven
- ✓ Universal 100-200mm chuck
- ✓ Optional Probe to Pad Alignment Optics
- ✓ Probe Cleaning Pad & Brush

New Probe Frame Assembly

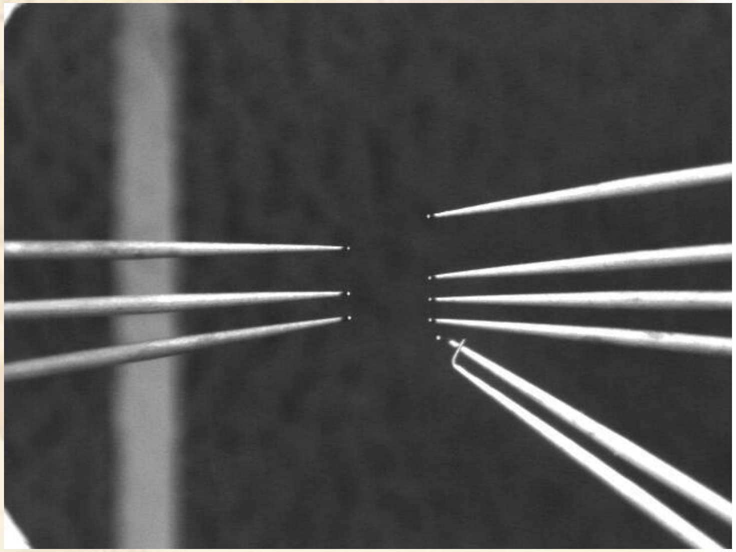
- ✓ Stepper Driven Z Translation
- ✓ Repeatable System to System Setup
- ✓ Manual One Time Planarization
- ✓ Robust – Handles High Probe Force
- ✓ Optional Automated Probe Alignment



Vision Module

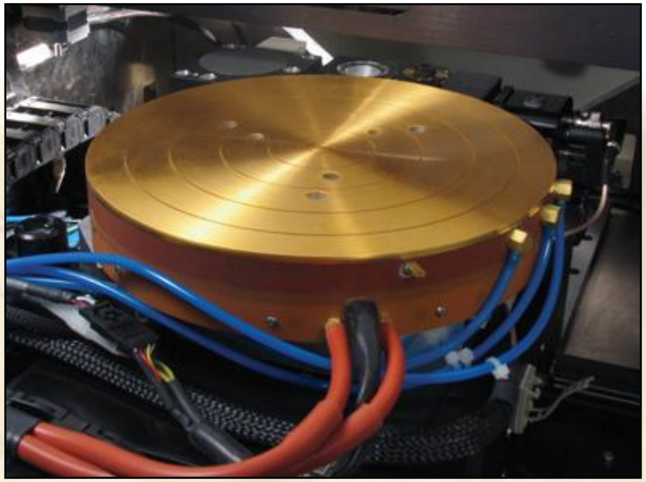
Cognex 8100 Controlling:

- ✓ Hi Mag Vision Camera
- ✓ Lo Mag Vision Camera
- ✓ Probe Alignment Camera
- ✓ OCR Camera
- ✓ Hi/Lo Mag View Illumination Control
- ✓ Probe View Illumination control
- ✓ OCR Illumination Control



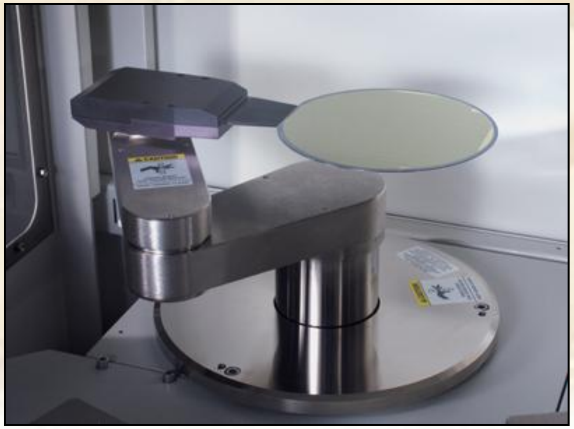
Temptronic Hot Chuck Option

- ✓ Trim & test critical components at end-use temperature.



Wafer Align, Handling & OCR

- ✓ Easily-docked option provides automated support for unattended operation.



M310 versus M350 Comparison

Description	M310	M350	Comments
Prober Performance			
X-Y Table type	Air Bearing, open loop stepper motor	Linear stage, closed loop DC servo	
X Travel range		9.5"	
Y Travel range		13.0"	
X-Y Accuracy	+/- 6.5 microns	+/- 2 micron	
X-Y repeatability	+/- 5.0 microns	+/- 0.5 microns	
X-Y resolution	2.5 microns	0.02 microns	
Step & settle time (Umove)	500 msec	250 msec	Umove index die to die
Acceleration	<1 G	< 1G	
Z travel range	10 mm	10 mm	
Z accuracy	N/A	<0.5 microns	
Z resolution	0.5 microns	0.13 microns	
Z step & settle time	~250 ms for 250 um move	20 ms max. for a 250 micron move	
Theta Range	+/- 5 degrees	+/- 5 degrees	
Theta resolution	<50 microradians	1.4 microradians	
Wafer Size	4,5,6, & 8 inches	4,5,6, & 8 inches	
Chuck top	Anodized AL, Ni, or gold finish	Anodized AL, Ni, or gold finish	
Wafer handler			M350 wafer handler redesigned for improved service/operator access and un-occluded 200mm wafer travel area
Wafers	250u to 750u thick, 100mm to 200mm	250u to 750u thick, 100mm to 200mm	
Capacity	2 cassettes	2 cassettes	
Type	3 Axis robot and pre-aligner	3 Axis robot and pre-aligner	
Options	OCR, Cassette scanner	OCR, Cassette scanner	
Probe Frame			
Degrees of freedom	6 (X,Y,Z, roll, pitch, theta)	Fixed in all axis, but Z	
X travel range		Fixed	
X resolution		N/A	
Y travel range		Fixed	
Y resolution		N/A	
Z travel range		15 mm	
Z resolution		2.5 microns	
Theta travel range		Fixed	
Theta resolution		N/A	
Probe force		10 lbs.	
Max. no. of probes	100	Maximum number depends on force per probe	
Probe to pad alignment accuracy	N/A	+/- 4 microns	
Probe planaraization	Manual, can be mis-adjusted via software	Manual setup and lockdown	
Probe card alignment	Manual	On chuck Probe to Pad Alignment vision system	

M310 versus M350 Comparison

Description	M310	M350	Comments
Wafer Chuck			
Probe cleaning	None	Yes- On chuck pad and brush assy	
Chuck size	4",6",8" chucks available	Universal 8" chuck with independent 4,6,8" vac controls. <5u deflection with 10lbs of probe force @100mm radius	
Hot Chuck	Temptronics compatible	Temptronics compatible	
Max. Temperature	Temptronics typically used up to 130 deg C	Temptronics typically used up to 130 deg C	New stiffer design for M350
Beam Positioner			
Type	Galvo w/stationary optics	Galvo w/stationary optics	
Positioning accuracy	<1 micron (3 sigma)	<1 micron (3 sigma)	
Positioning resolution	<0.06 microns	<0.06 microns	
Positioning speed	300 mm/sec max	300 mm/sec max	
Spot size	6.5-12.0 microns (1/e^2 adjustable)	6.5-12.0 w/options down to 5.0 microns w/ different scan lenses	
Lens clearance	72 mm from lens to wafer	72 mm from lens to wafer	
Field size (FOV)	14 mm diameter	14 mm diameter	
Laser type	Diode pumped YLF 1.047 microns	Diode pumped YLF 1.047 microns, YAG 1.064 microns and 532nm	
Laser energy	0.1uJ to 3 uJ @ 6.5 micron spot	0.1uJ to 3 uJ @ 6.5 micron spot, 7nsec version	
Laser energy stability	1.0% rms @ 1 KHz	1.0% rms @ 1 KHz	
Laser pulse width	7.0 +/- 1 ns @ 1 KHz std., 4.5 or 50 ns.	Choice of 7 nsec, 25nsec, and 50nsec	
Laser power control	AOM	AOM	
Power resolution	2000	2000	
Laser Eye		Enhanced Laser eye photodiode	
Laser Power Measurement	UDT	Coherent USB interface	
Vision Systems			
Pattern Recognition	Cognex 4100, 8200 series	Cognex 8100 series with PatMax	
Separate viewing monitor	Yes	Not needed	
OCR capability	Yes	Yes Cognex Acculight or Insight 1700 series	
Illumination Control	None, except on OCR	Software controllable illumination settings for all	

M310 versus M350 Comparison

Description	M310	M350	Comments
Physical			
System dimensions	826 mm L x 826 mm W x 1,525 mm H	920 mm W x 864 mm D x 1,575 mm H	
Weight	880 lbs.	TBD	
Power requirements (Std.)	115 VAC, 20A 1 phase	115 VAC, 20A 1 phase	
Power requirements (optional)	100/200 VAC, 10 A	100 to 240 VAC, 10 A	
UPS capability	Yes	Yes	
Supplied air	6 scfm @ 80 psig	6 scfm @ 80 psig	
Handler Dimensions	762 mm L x 692 mm D x1092 mm H	762 mm L x 864 mm D x1448 mm H	
Overall Dimensions	2337 mm L x 826 mm D x 1525 mm H	1628 mm L x 864 mm D x 1575 mm H	15 sq. ft.
Workstation Requirements			
Type of computer	Sun	PC Pentium 4 3Ghz	
Montior	17 in. color CRT	21 in. color Flat Panel	
Interfaces	Ethernet, RS232, GPIB, & SCSI (optional)	Ethernet, RS232, RS485 and USB	
Operating System	Unix	Windows 2000	
Computer station dimensions	889 mm x 711 mm x 1372 mm	TBD- Only keyboard and display outside system	
Interfaces			
Measurement system Interface	VXI, GPIB (Others)	GPIB, PXI, VXI	
Compatible with which testers	SZ, KVD,Creedance, PEI,Eagle,Teradyne etc...	SZ, KVD,Creedance, PEI,Eagle,Teradyne etc...	

M310 versus M350 Summary

✓ **Significant electrical and mechanical improvements in:**
  - XYZT stage
  - Chuck assy
  - Probe frame assy

  providing a more stable and repeatable system

✓ **New electronics architecture with today's FPGA and uProcessor technology:**
  - Enhanced beam control electronics
  - Enhanced laser eye photo diode electronics
  - State of the art motion control platform

✓ **Latest generation of Pattern Recognition hardware and software enabling:**
  - Improved wafer die alignment without having to allocate a die for alignment
  - Probe to Pad alignment
  - Improved Wafer focusing

✓ **New full featured PC/Windows based software**

WaferTrim Software System

- ✓ **WaferTrim™ Software in .NET**
  - Simple and ease of use interface layout for each user account: Operator, Engineer, Technician
  - Process Sequence Customization
  - Extend software functionalities through custom plug-in components

- ✓ **External Tester Interface**
  - Software/Hardware interface into WaferTrim™ and the M350 which allows the M350 to be controlled by ATE
  - Software communication through Ethernet, Serial Port or GPIB, with hardware interface through GSI Stop-Trim board

- ✓ **Industrial Standard PC running Windows OS**
  - Standard configuration: 21” monitor, CD writer, 3.5” floppy drive
  - Ethernet, RS232, USB, optional GPIB

Software Features

- ✓ **Processing Features**
  - Customizable Processing Sequences: Handler, Wafer and Die
  - Optional use of proprietary laser energy caching function to eliminate repeated energy measurements to optimize through-put
  - Yield Alarms Monitor
  - Illumination Settings Per Job
  - Wafer Result Map in XML format
  - Probe Cleaning Setups Library – shared among jobs

- ✓ **User Interface**
  - Geometry Editor – better zoom capability, region selection in rectangle or circle
  - Graphical Layout Profile per User Account
  - Internationalization
  - Context-Sensitive Help Database
  - Customization through .NET C# Plug-in: custom buttons/controls insertion

Software Features (continued)

- ✓ **M310 Backward Compatibility**
  - CTRIMS and llServer Files Import
  - Fully compatible with llServer UTI and CTRIMS ETI commands set allowing running the same Test programs on the M350

- ✓ **XTI-Server**
  - Cross Platform Tester Interface Server – fully compatible with both ETI/UTI commands within one interface

- ✓ **Probe-Pad Alignment**
  - Proprietary laser to probe camera calibration guarantees superior probe alignment
  - Probe Pad Editor allows the definition of pad position and size, and the exclusion of certain pads to optimize alignment time
  - Two probe camera magnifications allow for the quick and accurate probe-to-pad alignment
  - Probe Card Descriptions Library – shared among jobs

Software Features (continued)

- ✓ **Wafer Geometry**
  - Support Variable Street-size and/or Multi-Product on Single Wafer

- ✓ **Wafer Alignment**
  - **Faster** – Better Methodology, Faster Stage and PCI Vision Card
  - Support Targets on the street allowing dice saving
  - Ability to handle Small Die Template where multiple dice are seen within camera image
  - Unlimited Vision Templates providing more backups
  - Optional Auto-focus
  - Optional Auto-Wafer Center finding
  - Tool provides test functions for each alignment step as well as full alignment
  - Vision Template Files Library – shared among jobs

- ✓ **Focus Map**
  - Support Alignment Dice more than 5
  - Unlimited Test Dice – User selectable
  - Choice of Test Methods – CTRIMS, llServer, User selected dice

Software Features (continued)

✓ **Die Alignment**
  - Support Alignment Target on Every Other Row or Column – ability to process Die that has no alignment target
  - Ability to handle Small Laser Eye Target (~20% smaller than the original M310 specification)
  - Multi-Dice Alignment
    - Auto-Select Alignment Targets based on the Reticle
    - Backup Scheme
    - Simple & Friendly User Interface for Job Setup
  - Support Vision Alignment Target

✓ **Trim Tool**
  - Unlimited Cuts/Links

✓ **Link-Blast Tool**
  - Support Multi-Blast Pattern per Link with ability to set different Energy per blast
  - Ability to blast selected blasts in Multi-Blast Pattern with optional delay in between blasts
  - GSI Standard Repair File Format – ability to import any custom repair file format

Software Features (continued)

- ✓ **OCR**
  - Cognex Insight 17xx – Barcode and 2D Matrix
  - OCR Setup Profiles Library – shared among jobs
  - Support Custom OCR Reader through .NET C# Plug-in

- ✓ **Handler**
  - Cassette Profiles Library – position teaching one time per cassette
  - Cassette Loading Wizard
  - Cassette Process Priority Setting
  - Improved Error Checking and Recovery

- ✓ **Service and Maintenance**
  - Cals-and-Checkers Manager: Dependencies, Status
  - Preventive Maintenance Scheduling
  - Service Tools for each sub-system
  - System Alarms Monitor

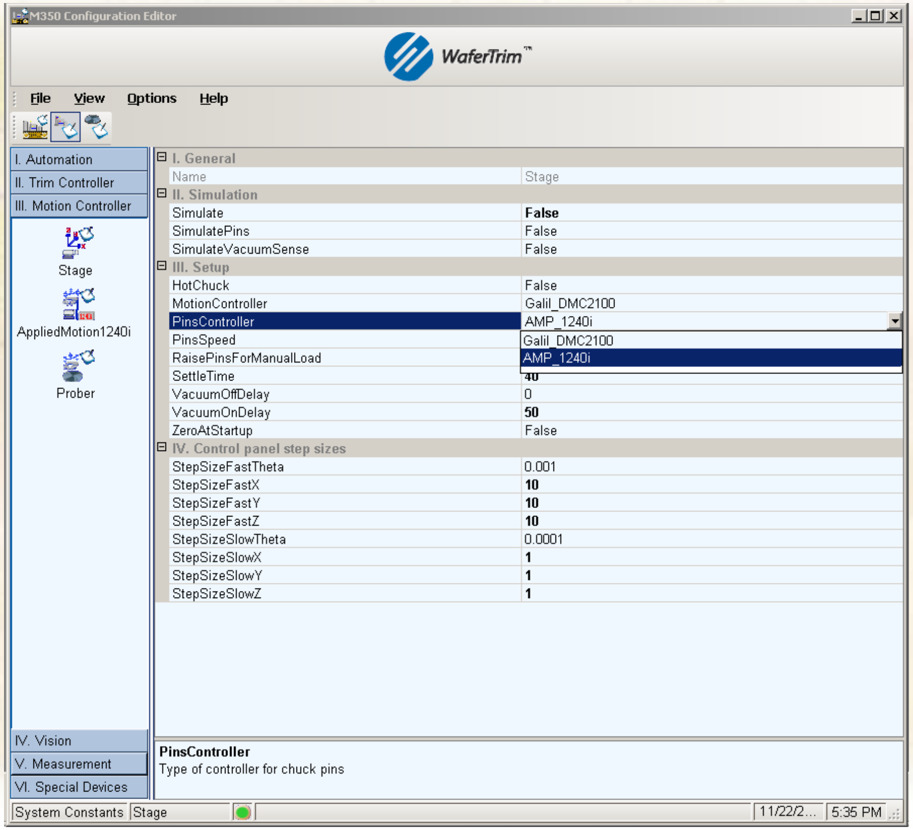
New Software Features

- ✓ **New Features**
  - Processing Dice with missing Alignment Target – using target located in vicinity
  - Processing Wafer with Variable Periodicity or Streetsize
  - Processing Wafer with Combo-Device
  - Wafer Alignment using Vision Target Smaller than the Camera View

- ✓ **Through-put Optimization**
  - Laser Energy Caching
  - MDA Backup Scheme
  - Processing Dice within Reticle in Serpentine Pattern
  - Wafer Result Map (File & Display) Update during Stage Move
  - Real-time Sorting Repair Links of Next Reticle during Stage Move

WaferTrim User Interface

- ✓ System Configuration Editor



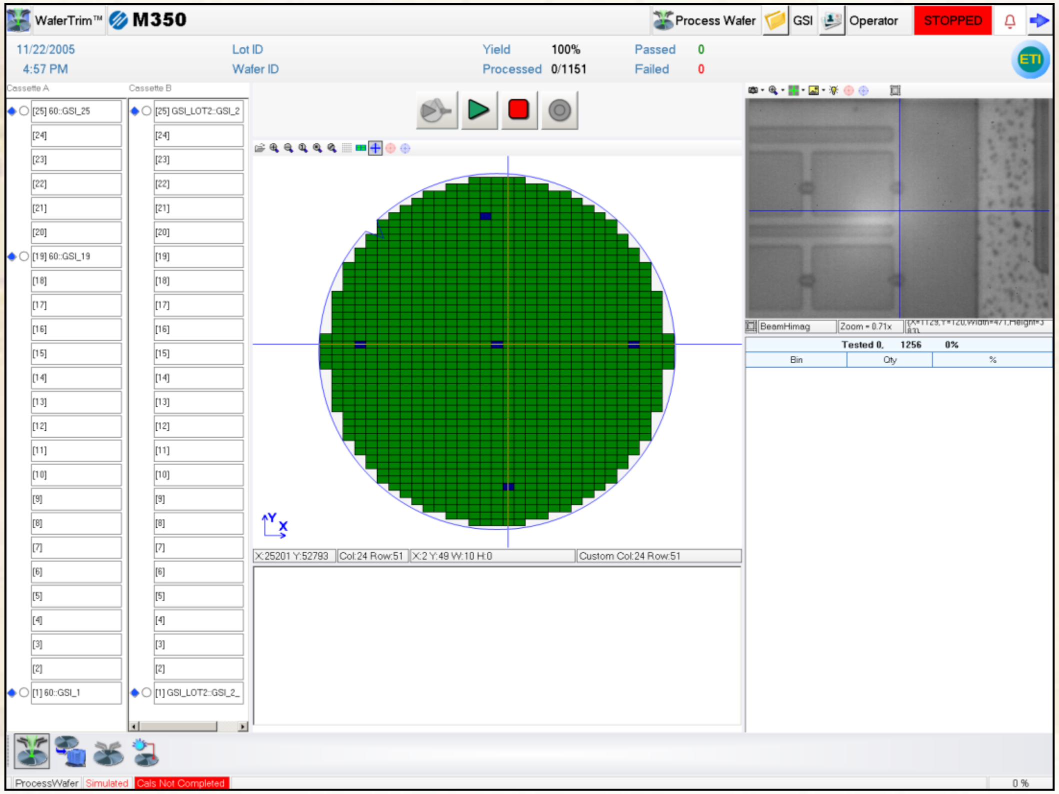
I. General	
Name	Stage
II. Simulation	
Simulate	**False**
SimulatePins	False
SimulateVacuumSense	False
III. Setup	
HotChuck	False
MotionController	Galil_DMC2100
PinsController	AMP_1240i Galil_DMC2100 AMP_1240i
PinsSpeed	
RaisePinsForManualLoad	
SettleTime	**40**
VacuumOffDelay	0
VacuumOnDelay	**50**
ZeroAtStartup	False
IV. Control panel step sizes	
StepSizeFastTheta	0.001
StepSizeFastX	**10**
StepSizeFastY	**10**
StepSizeFastZ	**10**
StepSizeSlowTheta	0.0001
StepSizeSlowX	**1**
StepSizeSlowY	**1**
StepSizeSlowZ	**1**

PinsController
Type of controller for chuck pins

Defines system hardware configuration and operation parameters

WaferTrim User Interface

- ✓ Operator Interface - Production View



11/22/2005
4:57 PM

Lot ID
Wafer ID

Yield 100%
Processed 0/1151

Passed 0
Failed 0

Cassette A	Cassette B
[25] 60::GSI_25	[25] GSI_LOT2::GSI_2
[24]	[24]
[23]	[23]
[22]	[22]
[21]	[21]
[20]	[20]
[19] 60::GSI_19	[19]
[18]	[18]
[17]	[17]
[16]	[16]
[15]	[15]
[14]	[14]
[13]	[13]
[12]	[12]
[11]	[11]
[10]	[10]
[9]	[9]
[8]	[8]
[7]	[7]
[6]	[6]
[5]	[5]
[4]	[4]
[3]	[3]
[2]	[2]
[1] 60::GSI_1	[1] GSI_LOT2::GSI_2_

X:25201 Y:52793 | Col:24 Row:51 | X:2 Y:49 W:10 H:0 | Custom Col:24 Row:51

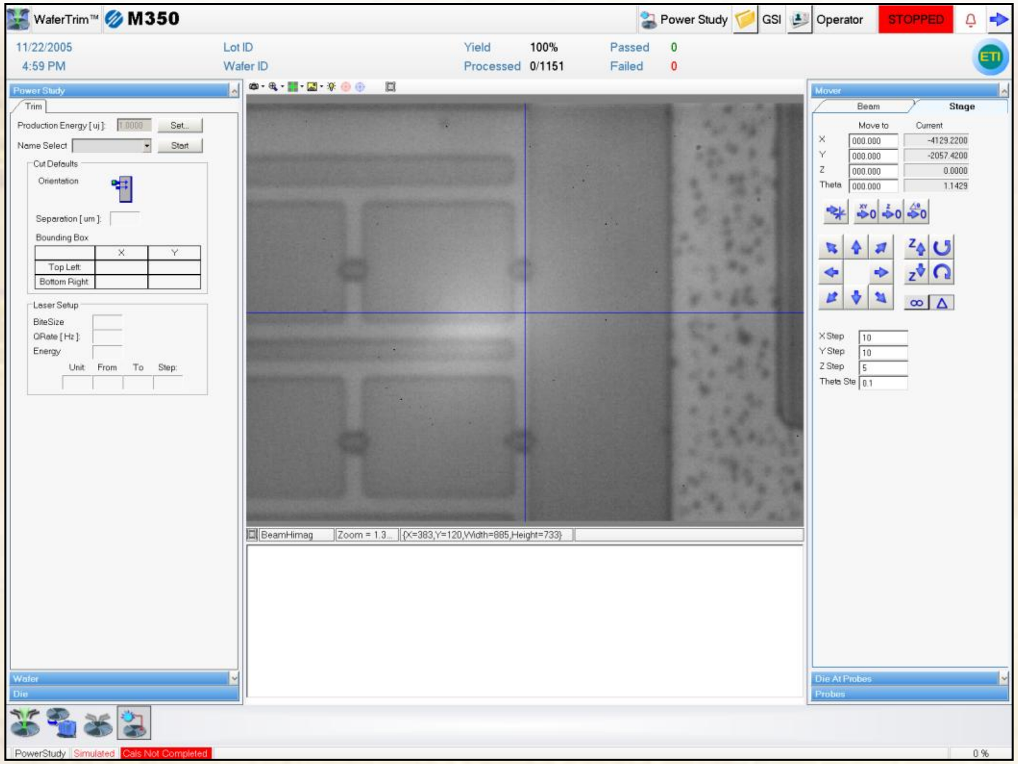
Tested 0, 1256 0%

ProcessWafer | Simulated | Cals Not Completed | 0 %

Simple Graphical User Interface for production operations

WaferTrim User Interface

- ✓ Operator Interface - Power Study



11/22/2005
4:59 PM

Lot ID
Wafer ID

Yield 100%
Processed 0/1151

Passed 0
Failed 0

Production Energy [uj]: 1.0000

Name Select

	X	Y
Top Left:		
Bottom Right:		

	Move to	Current
X	000.000	-4129.2200
Y	000.000	-2057.4200
Z	000.000	0.0000
Theta	000.000	1.1429

X Step 10
Y Step 10
Z Step 5
Theta Ste 0.1

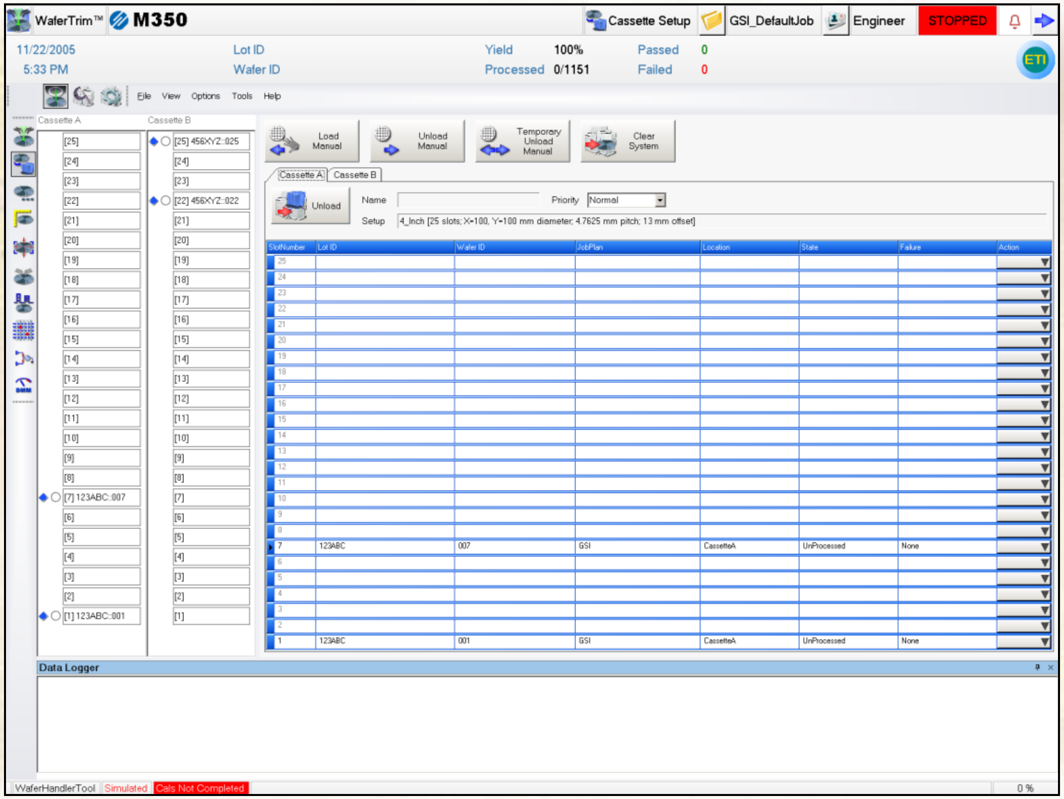
BeamHimag | Zoom = 1.3... | {X=383,Y=120,Width=885,Height=733}

PowerStudy | Simulated | Cals Not Completed | 0 %

Easy to use Operator tools for Production Setup

WaferTrim User Interface

✓ Automation Setup - Handler Tool



11/22/2005
5:33 PM
Lot ID
Wafer ID
Yield 100%
Processed 0/1151
Passed 0
Failed 0

Cassette A: [7] 123ABC:007, [1] 123ABC:001
Cassette B: [25] 456XYZ:025, [22] 456XYZ:022

Name
Priority Normal
Setup 4_Inch [25 slots; X=100, Y=100 mm diameter; 4.7625 mm pitch; 13 mm offset]

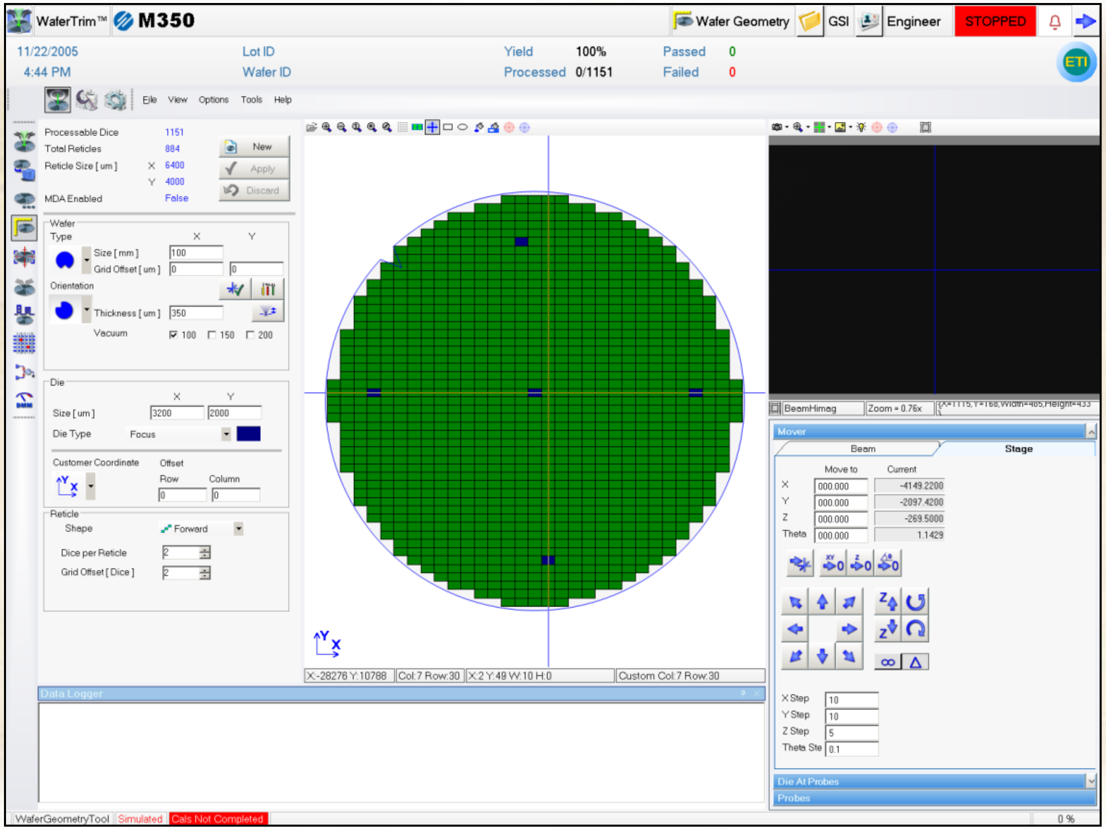
SlotNumber	Lot ID	Wafer ID	JobPlan	Location	State	Failure	Action
25							
24							
23							
22							
21							
20							
19							
18							
17							
16							
15							
14							
13							
12							
11							
10							
9							
8							
7	123ABC	007	GSI	CassetteA	UnProcessed	None	
6							
5							
4							
3							
2							
1	123ABC	001	GSI	CassetteA	UnProcessed	None	

WaferHandlerTool | Simulated | Cals Not Completed | 0 %

Built-in cassette setup wizard makes thing simple for system automation

WaferTrim User Interface

✓ Job Development 1 - Wafer Geometry Editor



11/22/2005
4:44 PM
Lot ID
Wafer ID
Yield 100%
Processed 0/1151
Passed 0
Failed 0

Processable Dice 1151
Total Reticles 884
Reticle Size [um] X 6400
Y 4000
MDA Enabled False

Wafer
Type
Size [mm] X 100
Grid Offset [um] X 0 Y 0
Orientation
Thickness [um] 350
Vacuum ☑ 100 ☐ 150 ☐ 200

Die
Size [um] X 3200 Y 2000
Die Type Focus
Customer Coordinate
Offset Row 0 Column 0

Reticle
Shape Forward
Dice per Reticle 2
Grid Offset [Dice] 2

X:-28276 Y:10788 | Col:7 Row:30 | X:2 Y:49 W:10 H:0 | Custom Col:7 Row:30

BeamHimag | Zoom = 0.76x | {X=1115,Y=168,Width=465,Height=433}

	Move to	Current
X	000.000	-4149.2200
Y	000.000	-2097.4200
Z	000.000	-269.5000
Theta	000.000	1.1429

X Step 10
Y Step 10
Z Step 5
Theta Ste 0.1

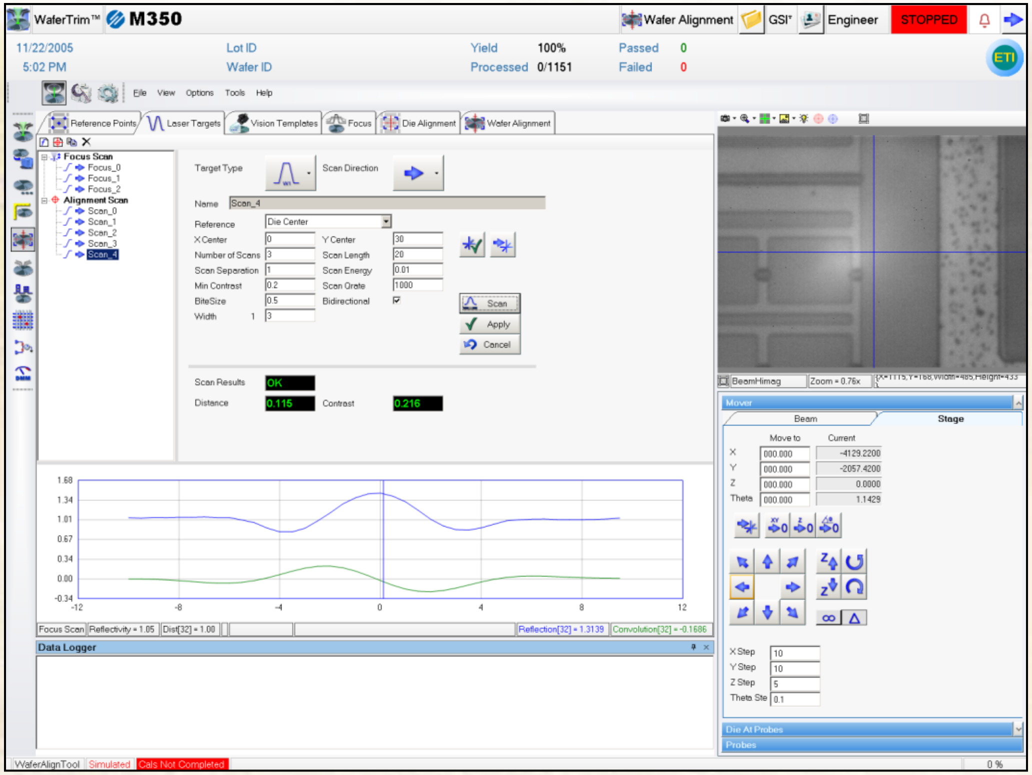
WaferGeometryTool | Simulated | Cals Not Completed | 0 %

Expanded Graphical User Interface enables rapid application development

Company Confidential

WaferTrim User Interface

✓ Job Development 2a - Laser Eye Setup



11/22/2005
5:02 PM
Lot ID
Wafer ID
Yield 100%
Processed 0/1151
Passed 0
Failed 0

Target Type
Scan Direction
Name: Scan_4
Reference: Die Center
X Center: 0
Y Center: 30
Number of Scans: 3
Scan Length: 20
Scan Separation: 1
Scan Energy: 0.01
Min Contrast: 0.2
Scan Qrate: 1000
BiteSize: 0.5
Bidirectional: ☑
Width 1: 3

Scan Results: OK
Distance: 0.115
Contrast: 0.216

Focus Scan | Reflectivity = 1.05 | Dist[32] = 1.00 | Reflection[32] = 1.3139 | Convolution[32] = -0.1686

BeamHimag | Zoom = 0.76x | {X=1115,Y=168,Width=485,Height=433}

	Move to	Current
X	000.000	-4129.2200
Y	000.000	-2057.4200
Z	000.000	0.0000
Theta	000.000	1.1429

X Step: 10
Y Step: 10
Z Step: 5
Theta Ste: 0.1

Die At Probes
Probes

Define and test laser alignment targets on actual device; the targets may be used in die-alignment and die-focus functions

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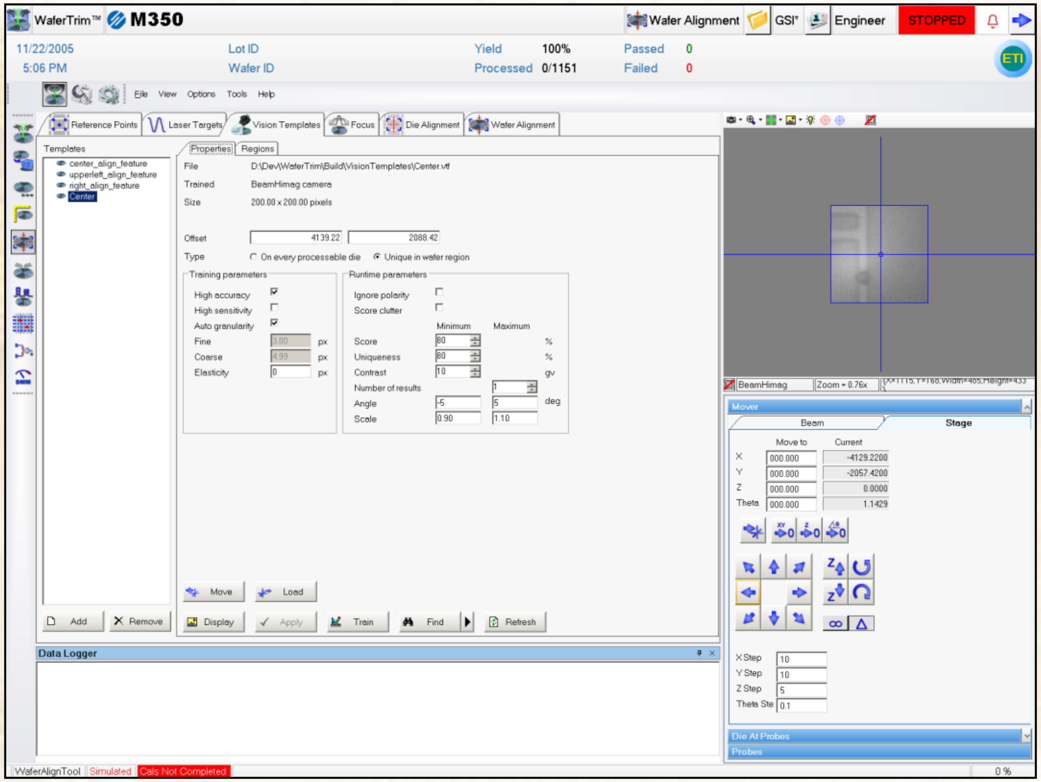
Company Confidential

WaferTrim User Interface

✓ Job Development 2b - Vision Template Setup



11/22/2005
5:06 PM
Lot ID
Wafer ID
Yield 100%
Processed 0/1151
Passed 0
Failed 0

Templates
- center_align_feature
- upperleft_align_feature
- right_align_feature
- Center

File D:\Dev\WaferTrim\Build\VisionTemplates\Center.vtf
Trained BeamHimag camera
Size 200.00 x 200.00 pixels

Offset 4139.22 2088.42
Type ○ On every processable die ● Unique in wafer region

Training parameters
High accuracy ☑
High sensitivity ☐
Auto granularity ☑
Fine 3.00 px
Coarse 4.99 px
Elasticity 0 px

Runtime parameters
Ignore polarity ☐
Score clutter ☐

	Minimum	Maximum	
Score	80		%
Uniqueness	80		%
Contrast	10		gv
Number of results		1	
Angle	-5	5	deg
Scale	0.90	1.10	

BeamHimag Zoom = 0.76x {X=1115,Y=168,Width=485,Height=433}

	Move to	Current
X	000.000	-4129.2200
Y	000.000	-2057.4200
Z	000.000	0.0000
Theta	000.000	1.1429

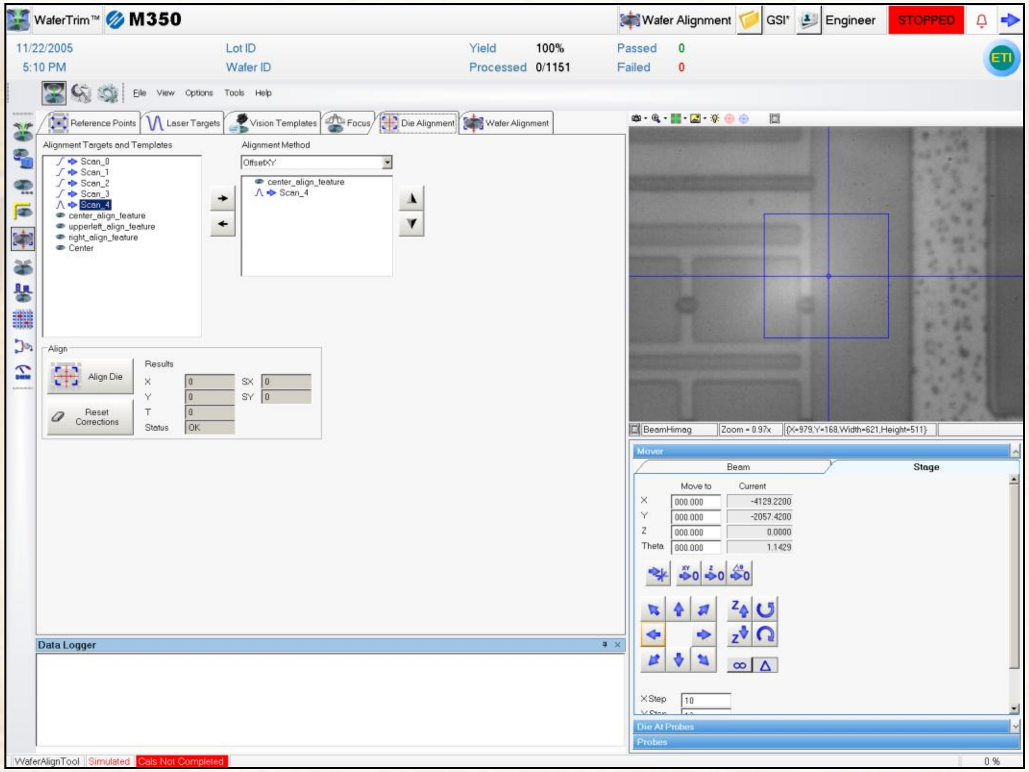
X Step 10
Y Step 10
Z Step 5
Theta Ste 0.1

0 %

Define and test vision alignment targets on actual device

WaferTrim User Interface

- ✓ Job Development 3 - Die Alignment Tool



11/22/2005
5:10 PM

Lot ID
Wafer ID

Yield 100%
Processed 0/1151

Passed 0
Failed 0

Alignment Targets and Templates
- Scan_0
- Scan_1
- Scan_2
- Scan_3
- Scan_4
- center_align_feature
- upperleft_align_feature
- right_align_feature
- Center

Alignment Method: OffsetXY
- center_align_feature
- Scan_4

Align

Results

X 0
Y 0
T 0
Status OK

SX 0
SY 0

BeamHimag
Zoom = 0.97x
{X=979,Y=168,Width=621,Height=511}

	Move to	Current
X	000.000	-4129.2200
Y	000.000	-2057.4200
Z	000.000	0.0000
Theta	000.000	1.1429

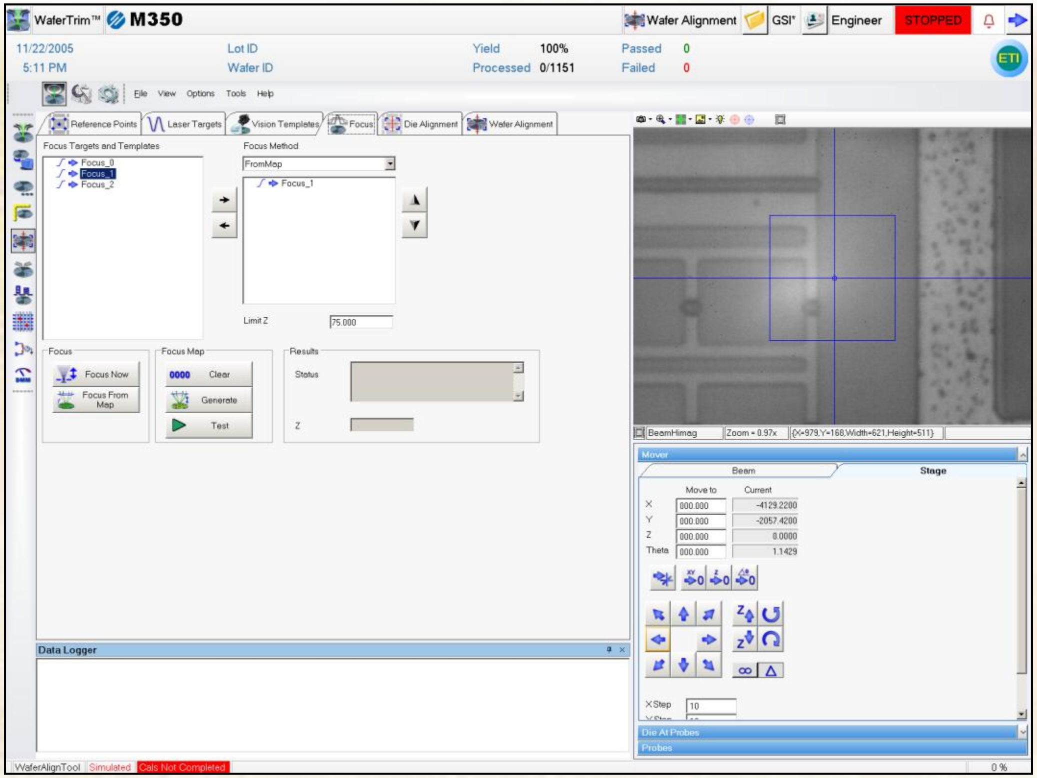
XStep 10

WaferAlignTool
Simulated
Cals Not Completed
0 %

Define and test Die Alignment Method and Targets from a selection of both laser eye scan and vision targets

WaferTrim User Interface

- ✓ Job Development 4 - Die Focus Tool



11/22/2005
5:11 PM

Lot ID
Wafer ID

Yield 100%
Processed 0/1151
Passed 0
Failed 0

Focus Method: FromMap
Focus_1

Limit Z 75.000

BeamHimag | Zoom = 0.97x | {X=979,Y=168,Width=621,Height=511}

	Move to	Current
X	000.000	-4129.2200
Y	000.000	-2057.4200
Z	000.000	0.0000
Theta	000.000	1.1429

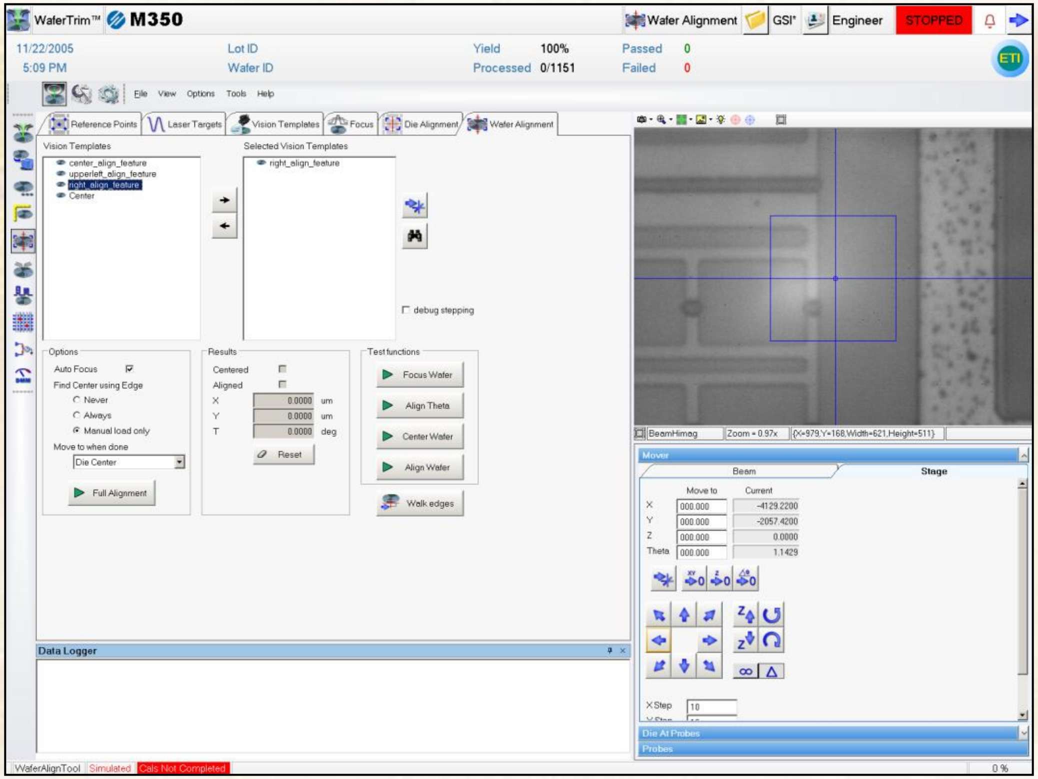
XStep 10

0 %

Define and test Die Focus Method and Targets from a selection of laser focus setup.

WaferTrim User Interface

✓ Job Development 5 - Wafer Alignment Tool



11/22/2005
5:09 PM
Lot ID
Wafer ID
Yield 100%
Processed 0/1151
Passed 0
Failed 0

Vision Templates:
- center_align_feature
- upperleft_align_feature
- right_align_feature
- Center

Selected Vision Templates:
- right_align_feature

☐ debug stepping

Options
Auto Focus ☑
Find Center using Edge
○ Never
○ Always
● Manual load only
Move to when done: Die Center

Results
Centered ☐
Aligned ☐
X 0.0000 um
Y 0.0000 um
T 0.0000 deg

BeamHimag | Zoom = 0.97x | {X=979,Y=168,Width=621,Height=511}

	Move to	Current
X	000.000	-4129.2200
Y	000.000	-2057.4200
Z	000.000	0.0000
Theta	000.000	1.1429

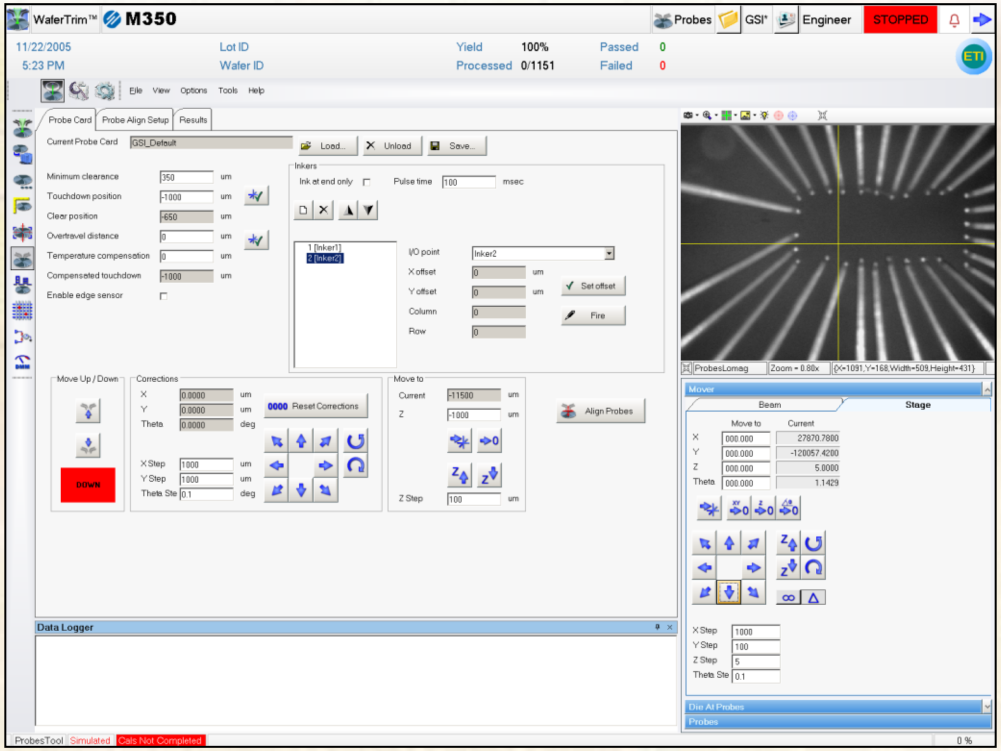
X Step: 10

WaferAlignTool | Simulated | Cals Not Completed | 0 %

Define and test Wafer Alignment Targets from a selection of vision template setup.

WaferTrim User Interface

✓ Job Development 6 - Probe Tool



11/22/2005
5:23 PM
Lot ID
Wafer ID
Yield 100%
Processed 0/1151
Passed 0
Failed 0

Current Probe Card: GSI_Default

Minimum clearance	350	um
Touchdown position	-1000	um
Clear position	-650	um
Overtravel distance	0	um
Temperature compensation	0	um
Compensated touchdown	-1000	um
Enable edge sensor	☐	

Inkers

Ink at end only ☐ Pulse time 100 msec

1 [Inker1]
2 [Inker2]

I/O point	Inker2	
X offset	0	um
Y offset	0	um
Column	0	
Row	0	

Corrections

X	0.0000	um
Y	0.0000	um
Theta	0.0000	deg
X Step	1000	um
Y Step	1000	um
Theta Ste	0.1	deg

Move to

Current	-11500	um
Z	-1000	um
Z Step	100	um

ProbesLomag | Zoom = 0.80x | {X=1091,Y=168,Width=509,Height=431}

	Move to	Current
X	000.000	27870.7800
Y	000.000	-120057.4200
Z	000.000	5.0000
Theta	000.000	1.1429

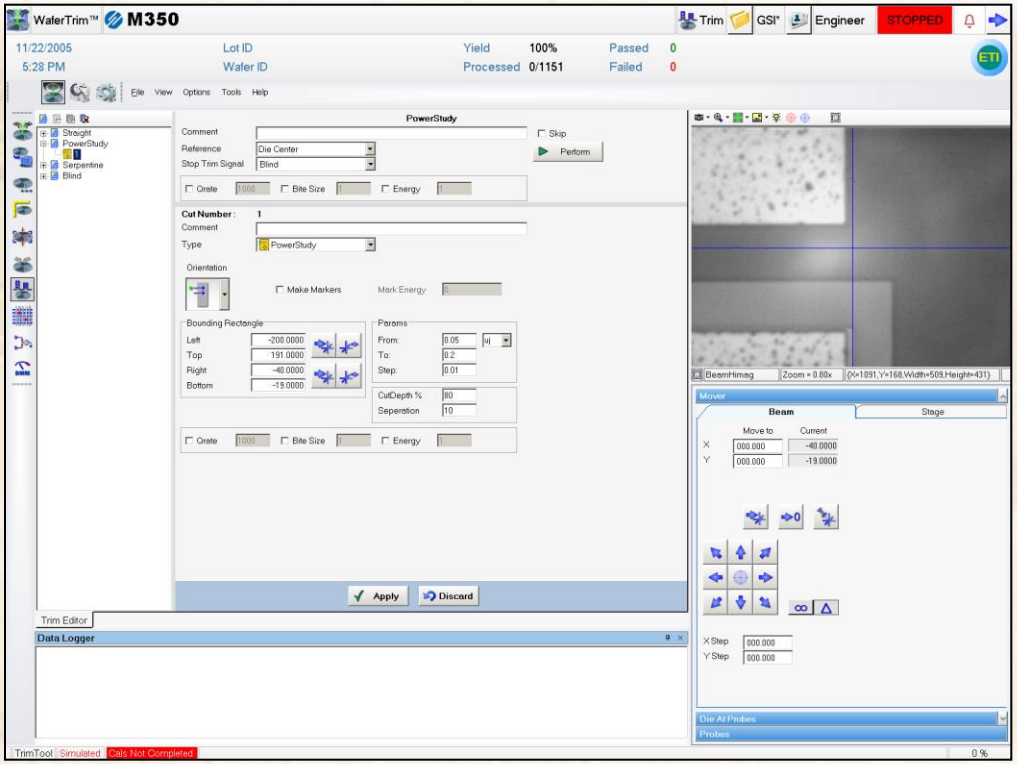
X Step	1000
Y Step	100
Z Step	5
Theta Ste	0.1

ProbesTool | Simulated | Cals Not Completed | 0 %

Easy and fast probe-to-pad alignment procedure

WaferTrim User Interface

- ✓ Job Development 7 - Trim Tool



11/22/2005
5:28 PM
Lot ID
Wafer ID
Yield 100%
Processed 0/1151
Passed 0
Failed 0

Comment
Reference: Die Center
Stop Trim Signal: Blind
☐ Skip
☐ Orete 1000 ☐ Bite Size 1 ☐ Energy 1

Cut Number : 1
Comment
Type: PowerStudy
☐ Make Markers
Mark Energy 0

Left: -200.0000
Top: 191.0000
Right: -40.0000
Bottom: -19.0000

From: 0.05 uj
To: 0.2
Step: 0.01
CutDepth %: 80
Seperation: 10

☐ Orete 1000 ☐ Bite Size 1 ☐ Energy 1

BeamHimag
Zoom = 0.80x
{X=1091,Y=168,Width=509,Height=431}

	Move to	Current
X	000.000	-40.0000
Y	000.000	-19.0000

X Step: 000.000
Y Step: 000.000

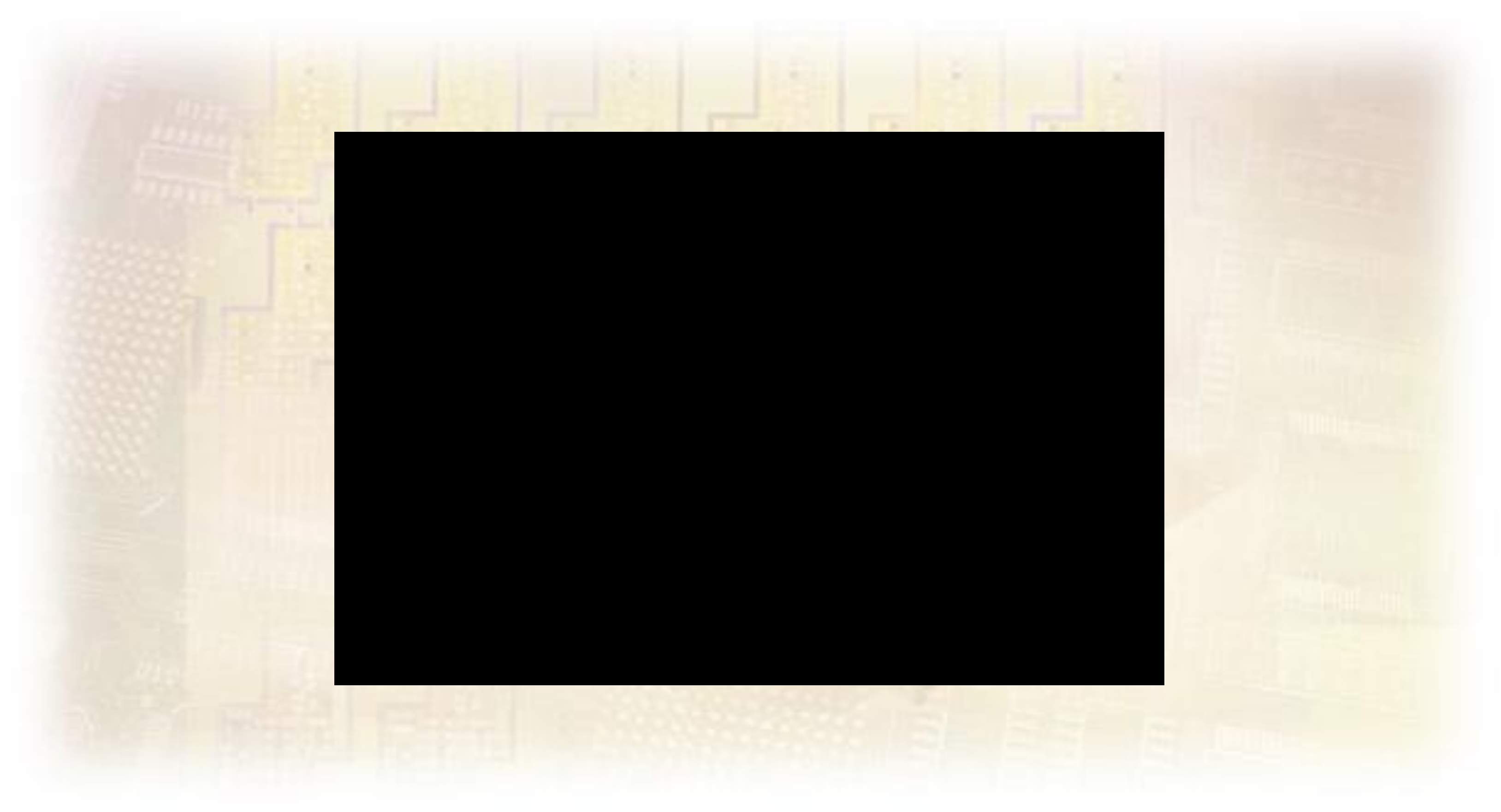
Define trim definitions including power study, trim-to-value as well as blind cuts

WaferTrim User Interface

✓ Job Development 8 - Other Options

- Process Sequence Customization
- User Interface Customization
- Power Studies
- Multiple Die Processing
- Designate Binning Scheme
- Light & Sounds Control
- External Tester Control

Trimming in Progress



Easy Integration with Testers

The M350 Integrates easily
with these testers and others.

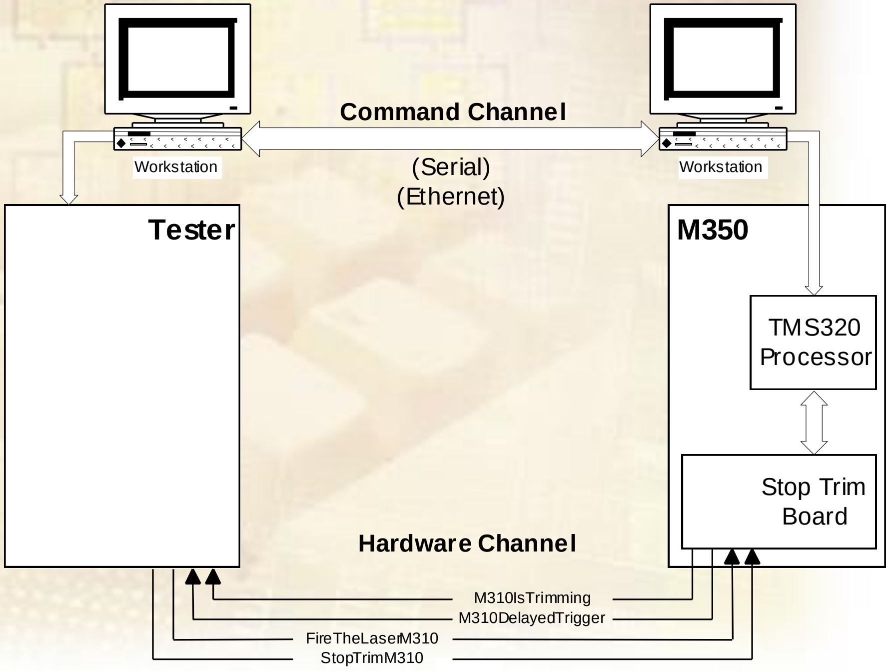
- ✓ WaferTrim TS910
- ✓ KVD
- ✓ Credence - TMT, SZ (Piranha)
- ✓ Eagle
- ✓ Teradyne - A360, A5xx Series)
- ✓ HP/Agilent
- ✓ Shibasoku

Easy Integration with Testers

The **E**xternal **T**ester **I**nterface (**ETI**) allows the M350 to connect to almost any tester or “home built rack & stack”.

Requirements:

- ✓UNIX or Windows based
- ✓Ethernet or Serial port



Measurement System Instrument Compatibility

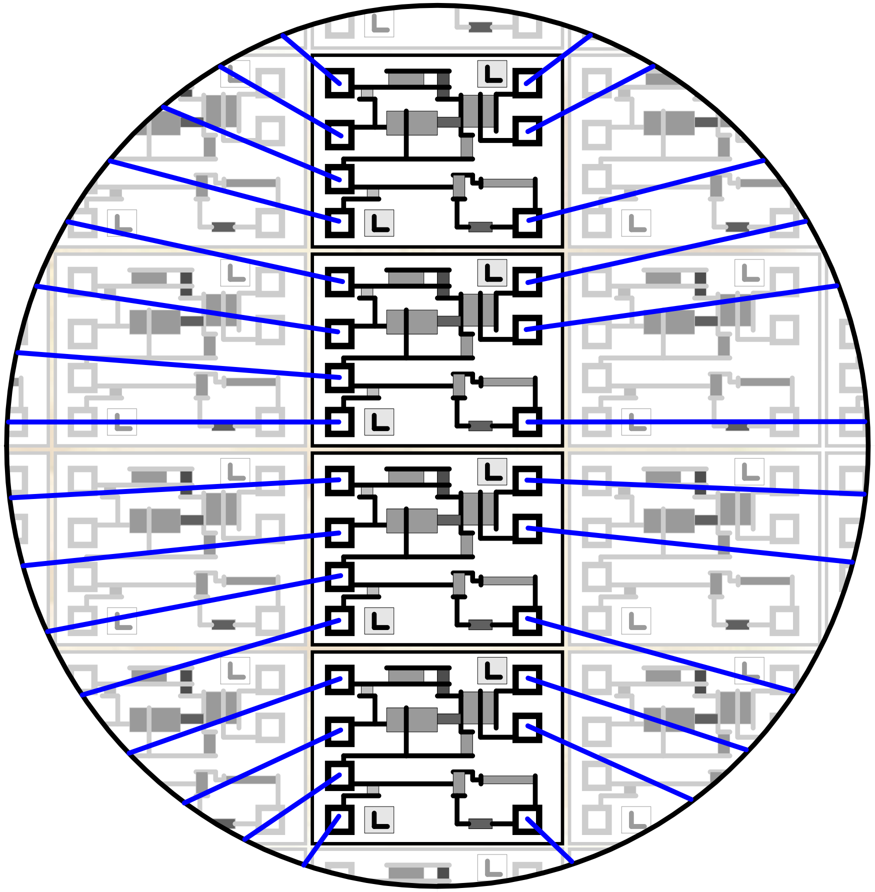
- ✓ National Instruments MXI-VXI compatible
- ✓ National Instruments GPIB compatible
- ✓ National Instruments Lab Windows CVI compatible

- ✓ Note: GSI Group offers procurement & integration of special measurement equipment.

Supports Multi-Site Trimming

Alignment Performed once per multiple die. This saves….

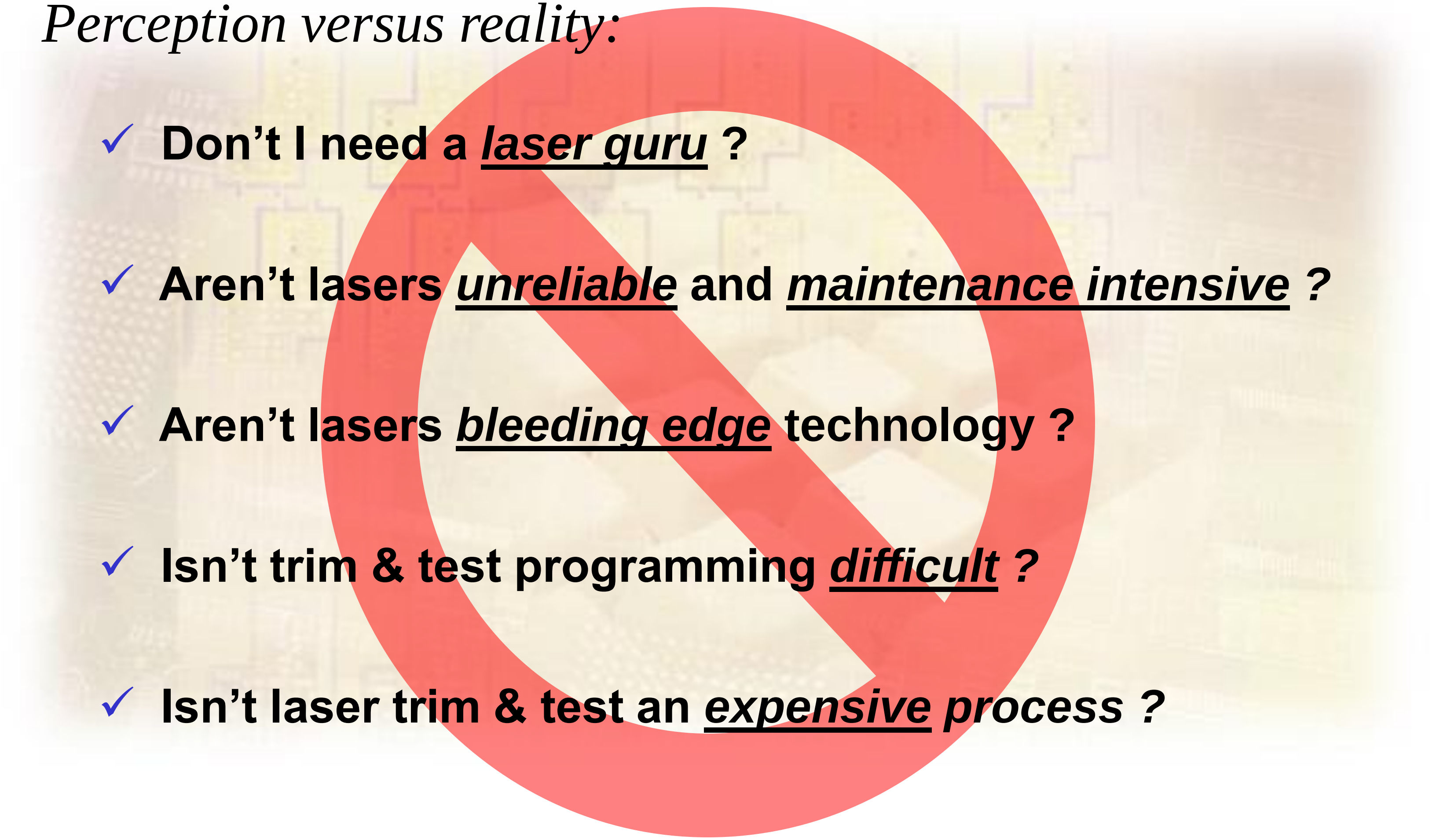
- ✓ *wafer step time*
- ✓ *fine die alignment time*
- ✓ *circuit settling time*



Remember the probes when designing die and alignment targets!

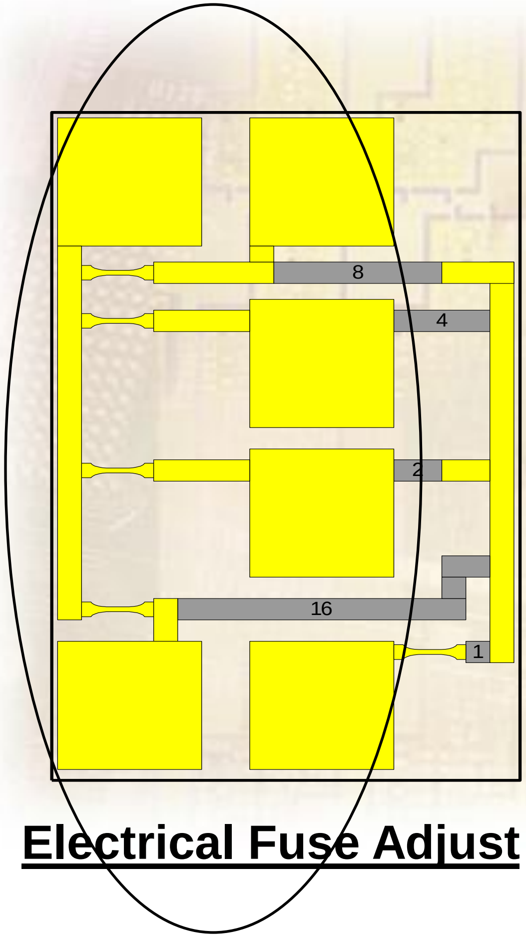
Laser Trim Mythology

Perception versus reality:



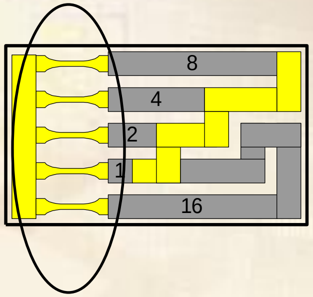
- ✓ **Don’t I need a *laser guru* ?**
- ✓ **Aren’t lasers *unreliable* and *maintenance intensive ?***
- ✓ **Aren’t lasers *bleeding edge* technology ?**
- ✓ **Isn’t trim & test programming *difficult ?***
- ✓ **Isn’t laser trim & test an *expensive process ?***

Laser Trim
"Real Estate" Advantage



Electrical Fuse Adjust

Laser Fuse Adjust



5X, 10X, 100X… ?

Probe pads = 75 x 75 microns
Link narrow area = 2 x 10 microns

Laser Trim Reality

The bottom line:

Smaller die size

enabling

Smaller packages and higher performance

which enables

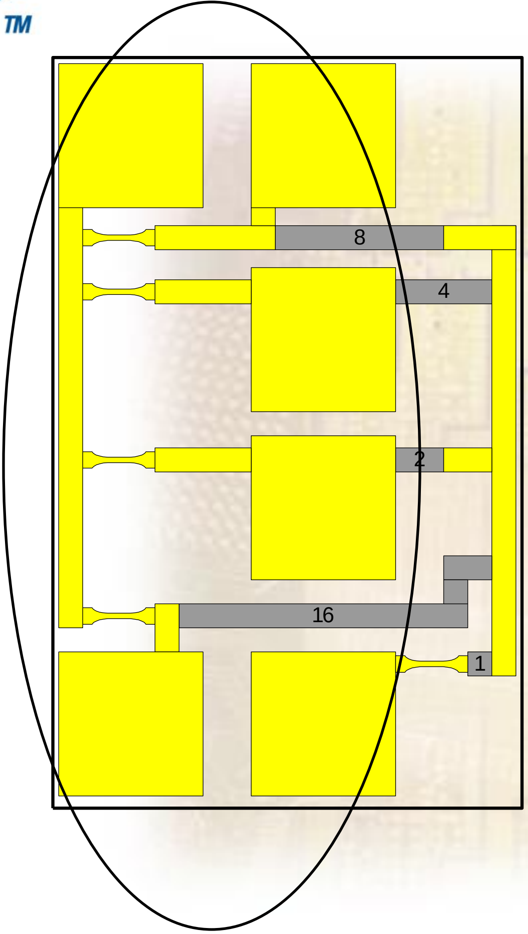
Lower costs and new applications

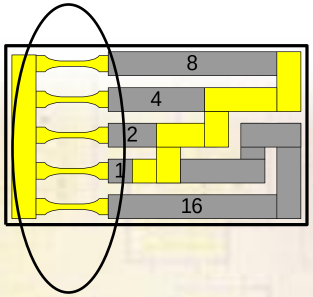
which enables

Higher profits and market growth

Global Reach

M350 Summary





- ✓ *Laser trimming is an enabling process to produce precision mixed signal, linear and passive networks*
- ✓ *Laser trimming is a mature field-proven technology*
- ✓ *Laser trimming is an essential tool to meet the relentless market demand for decreasing package size and higher performance parts*