IEEE SW Test Workshop
Semiconductor Wafer Test Workshop

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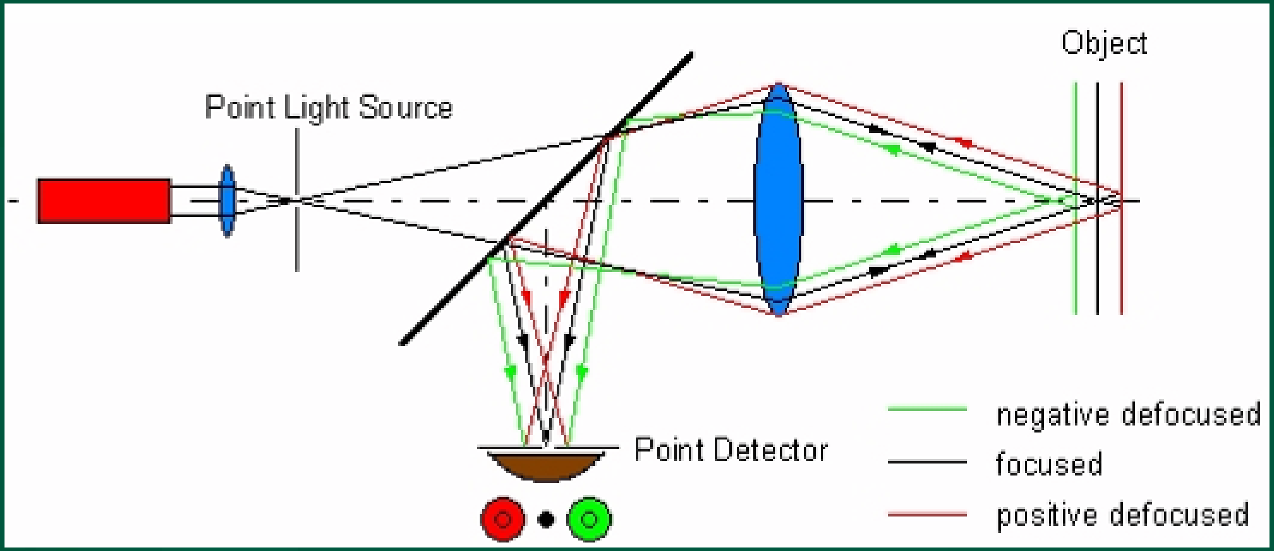
Hyphenated Systems

Advanced Confocal Microscopy on a Process-Capable Platform

June 8, 2008
San Diego, CA USA

Introduction (Part 1)

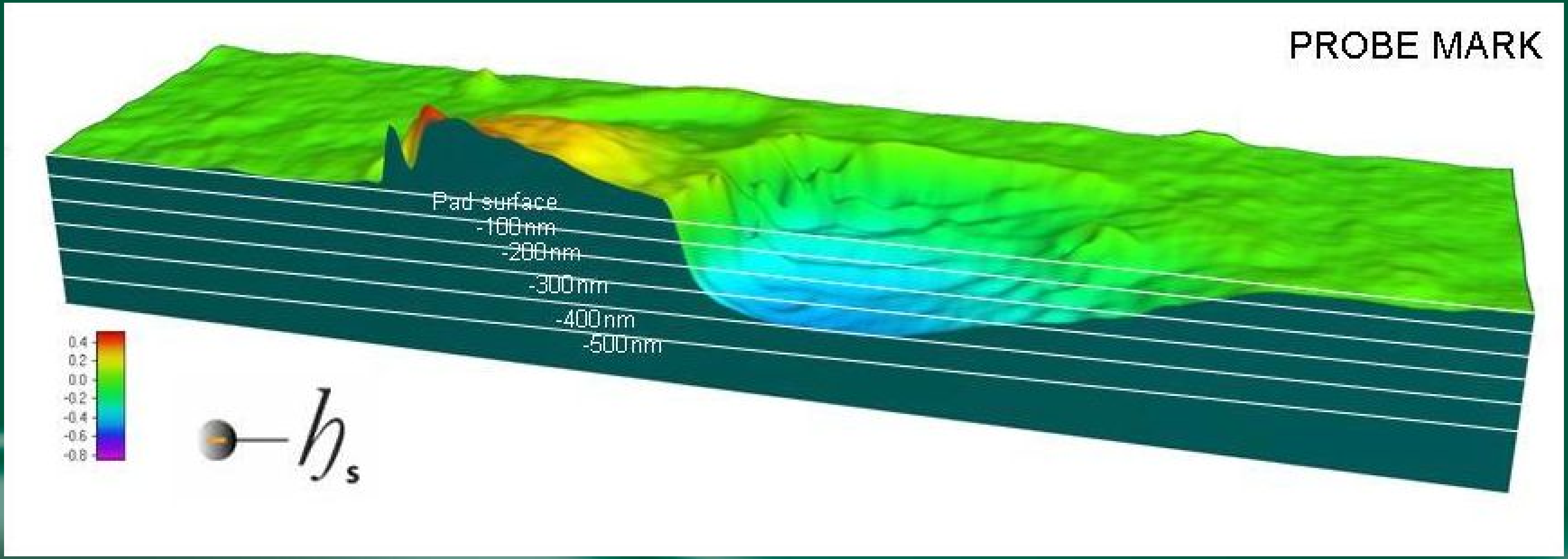
- History
  - Confocal Technique



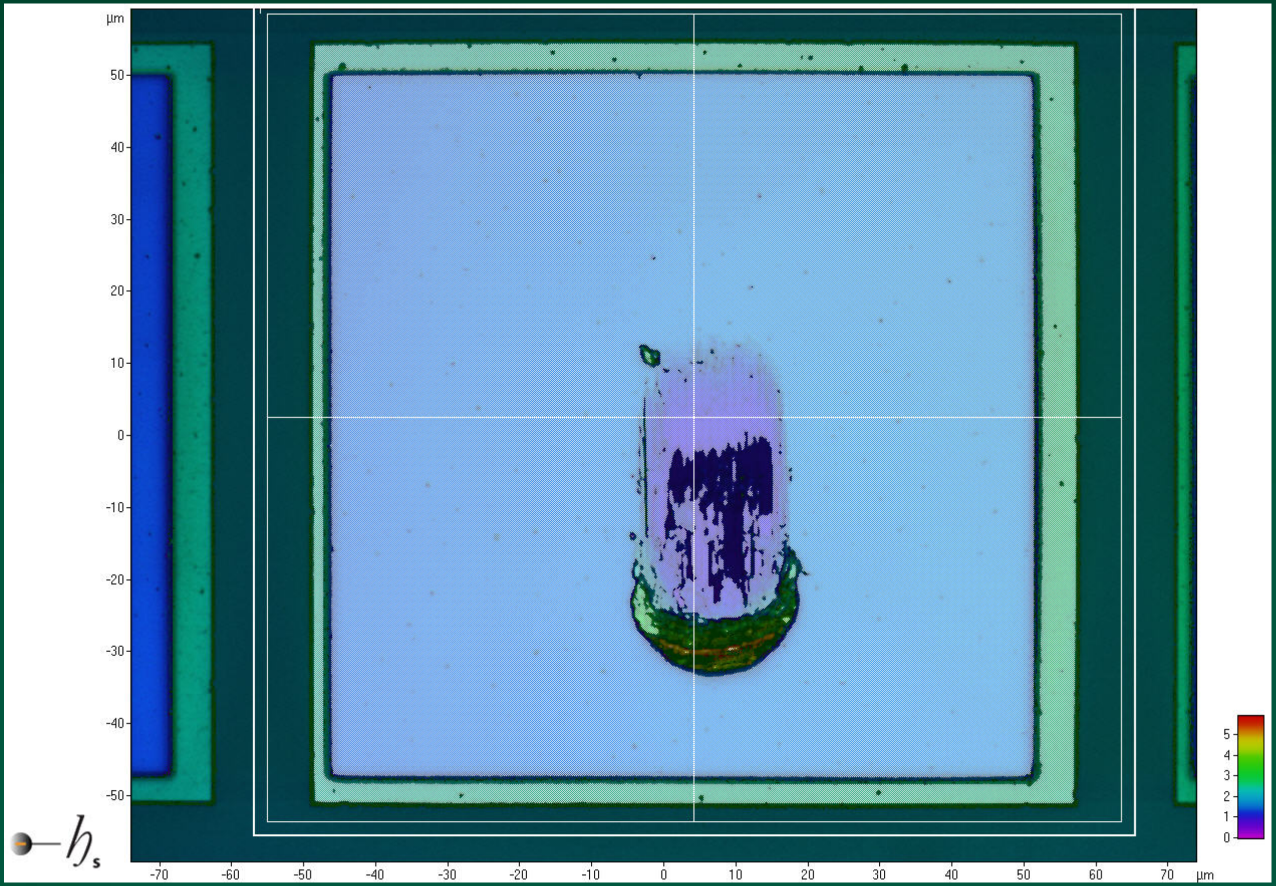
Introduction (Part 1)

History

- Confocal Technique
- Application of Advanced Confocal Microscopy

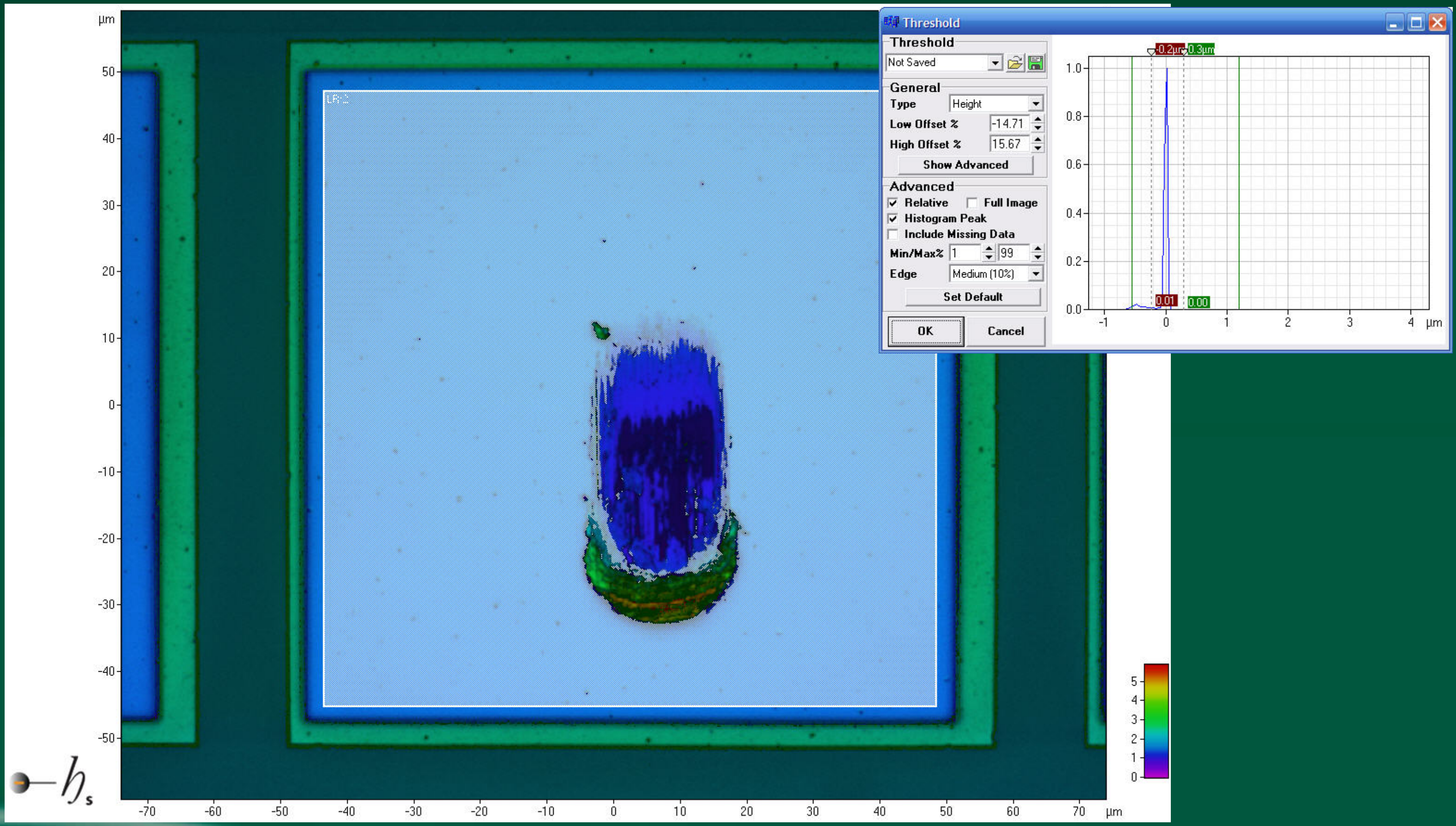


Introduction (Part 1)



Pattern recognition positions measuring tools

Introduction (Part 1)



Threshold

Not Saved

General

Type: Height

Low Offset %: -14.71

High Offset %: 15.67

Advanced

☑ Relative ☐ Full Image

☑ Histogram Peak

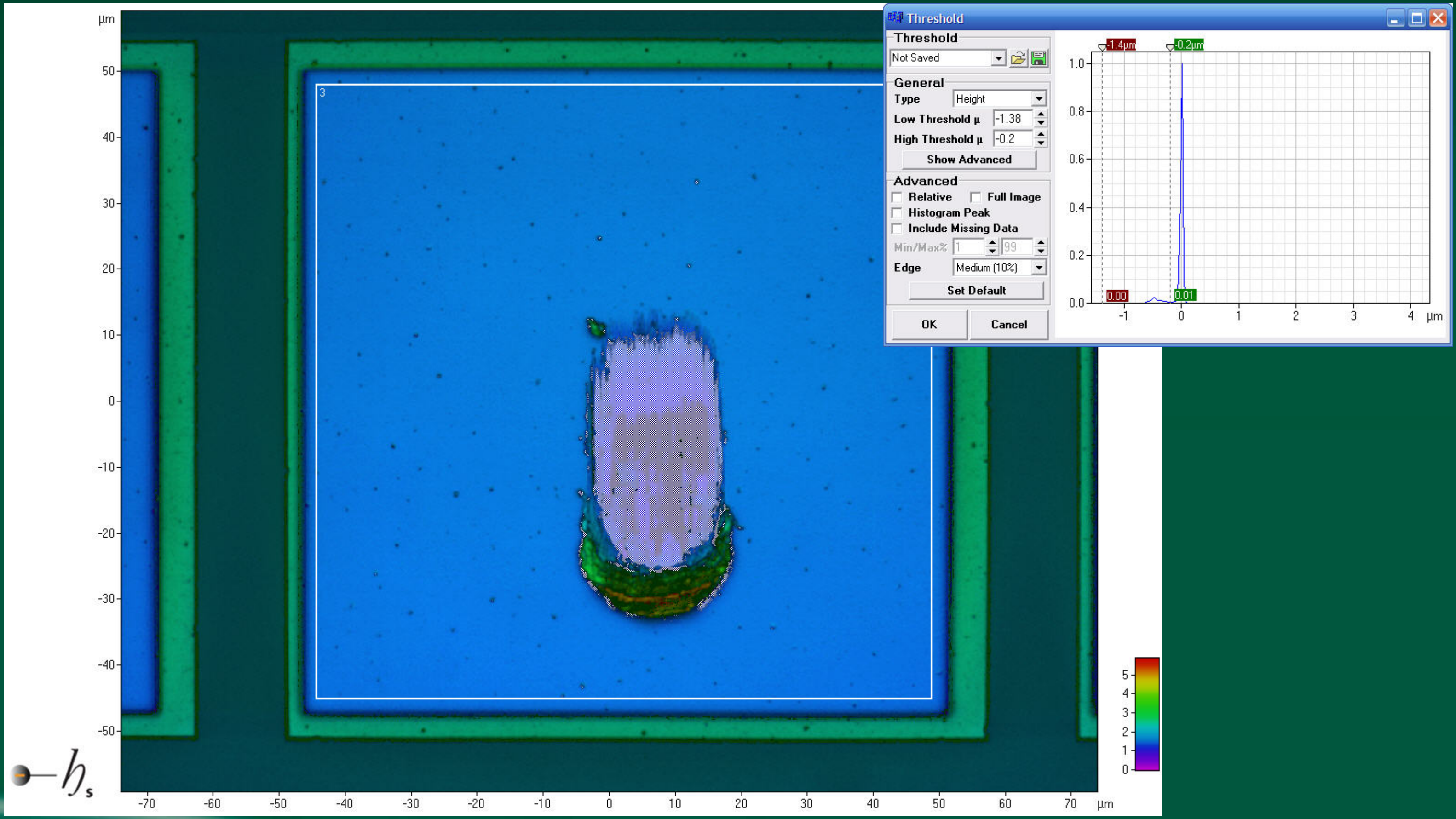
☐ Include Missing Data

Min/Max%: 1 99

Edge: Medium (10%)

Reference on the median height of the pad

Introduction (Part 1)



Threshold

Not Saved

General

Type: Height

Low Threshold µ: -1.38

High Threshold µ: -0.2

Advanced

☐ Relative ☐ Full Image

☐ Histogram Peak

☐ Include Missing Data

Min/Max%: 1 99

Edge: Medium (10%)

Volume of the lake

Introduction (Part 1)

History

- Confocal Technique
- Application of Advanced Confocal Microscopy
- FA & Engineering groups interested but…

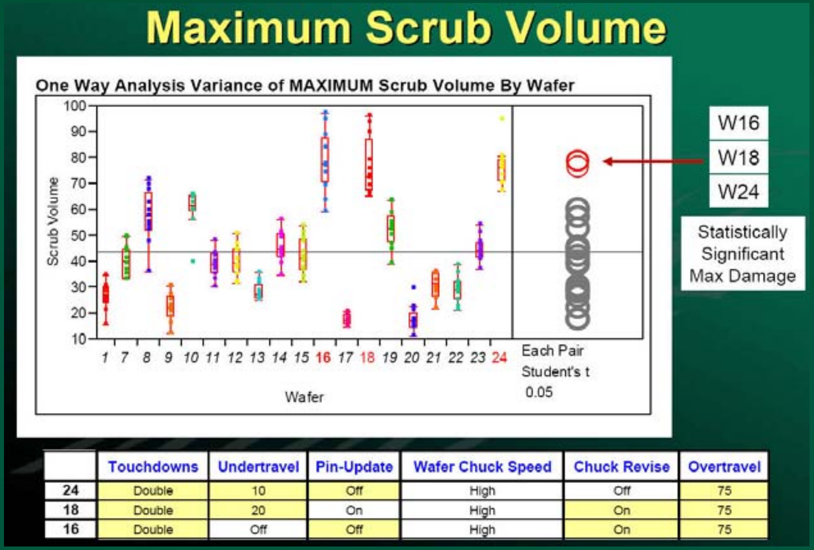
Introduction (Part 1)

History

- Confocal Technique
- Application of Advanced Confocal Microscopy
- FA & Engineering groups interested but…
- No production platform

Introduction (Part 2)

SWTW 2007

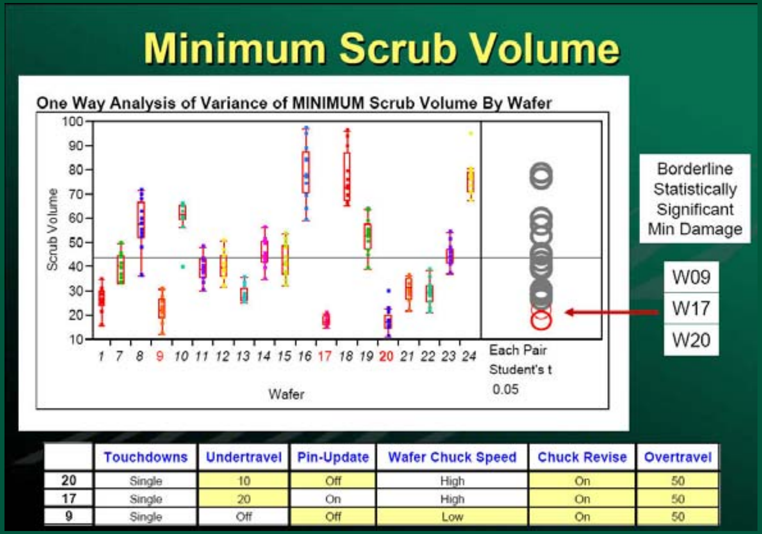


Maximum Scrub Volume

One Way Analysis Variance of MAXIMUM Scrub Volume By Wafer

Statistically Significant Max Damage

	Touchdowns	Undertravel	Pin-Update	Wafer Chuck Speed	Chuck Revise	Overtravel
24	Double	10	Off	High	Off	75
18	Double	20	On	High	On	75
16	Double	Off	Off	High	On	75



Minimum Scrub Volume

One Way Analysis of Variance of MINIMUM Scrub Volume By Wafer

Borderline Statistically Significant Min Damage

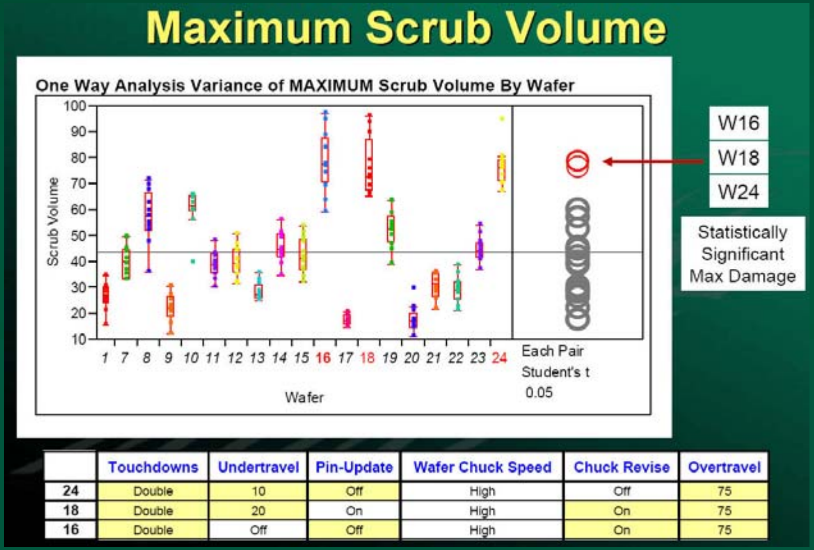
	Touchdowns	Undertravel	Pin-Update	Wafer Chuck Speed	Chuck Revise	Overtravel
20	Single	10	Off	High	On	50
17	Single	20	On	High	On	50
9	Single	Off	Off	Low	On	50

Source…

Miller et al.
SWTW 2007

Introduction (Part 2)

SWTW 2007



Maximum Scrub Volume

One Way Analysis Variance of MAXIMUM Scrub Volume By Wafer

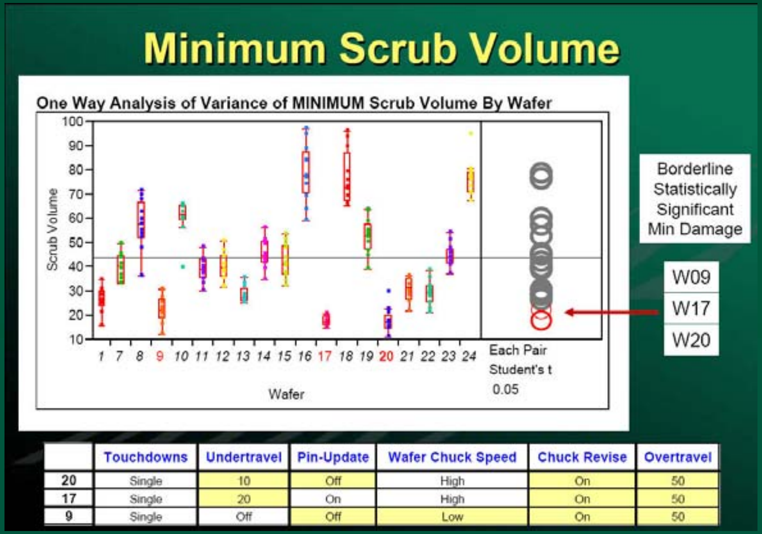
W16

W18

W24

Statistically Significant Max Damage

	Touchdowns	Undertravel	Pin-Update	Wafer Chuck Speed	Chuck Revise	Overtravel
24	Double	10	Off	High	Off	75
18	Double	20	On	High	On	75
16	Double	Off	Off	High	On	75



Minimum Scrub Volume

One Way Analysis of Variance of MINIMUM Scrub Volume By Wafer

Borderline Statistically Significant Min Damage

W09

W17

W20

	Touchdowns	Undertravel	Pin-Update	Wafer Chuck Speed	Chuck Revise	Overtravel
20	Single	10	Off	High	On	50
17	Single	20	On	High	On	50
9	Single	Off	Off	Low	On	50

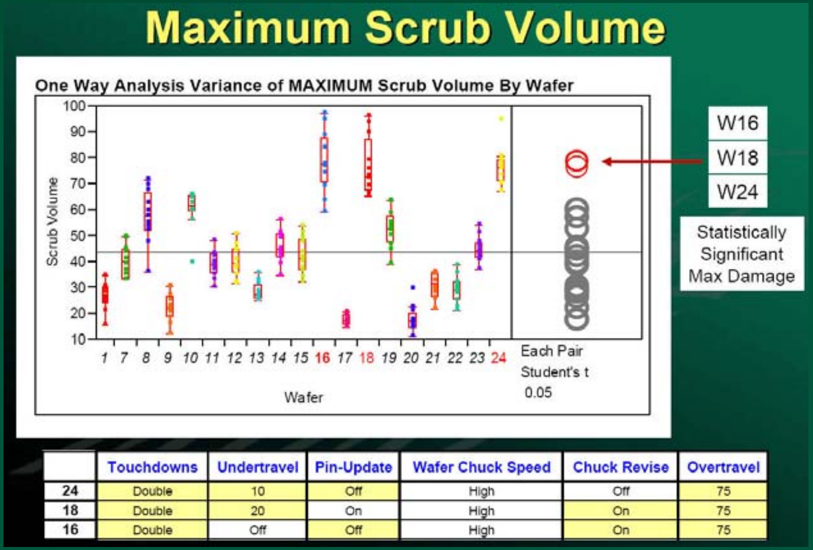
- Statistical analysis revealed some differences but…

Source…

Miller et al.
SWTW 2007

Introduction (Part 2)

- SWTW 2007



Maximum Scrub Volume

One Way Analysis Variance of MAXIMUM Scrub Volume By Wafer

W16
W18
W24

Statistically Significant Max Damage

	Touchdowns	Undertravel	Pin-Update	Wafer Chuck Speed	Chuck Revise	Overtravel
24	Double	10	Off	High	Off	75
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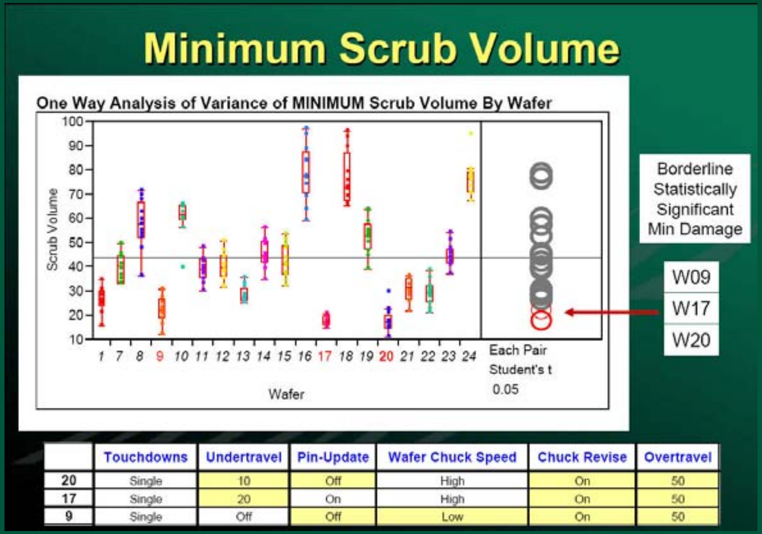


Minimum Scrub Volume

One Way Analysis of Variance of MINIMUM Scrub Volume By Wafer

Borderline Statistically Significant Min Damage

W09
W17
W20

	Touchdowns	Undertravel	Pin-Update	Wafer Chuck Speed	Chuck Revise	Overtravel
20	Single	10	Off	High	On	50
17	Single	20	On	High	On	50
9	Single	Off	Off	Low	On	50

- Statistical analysis revealed some differences but…
- No high throughput platform

Source…

Miller et al.
SWTW 2007

Object

Provide Advanced Confocal Metrology

  –

Object

Provide Advanced Confocal Metrology

- With high throughput
-

Object

Provide Advanced Confocal Metrology

- With high throughput
- On a production capable platform
-

Object

Provide Advanced Confocal Metrology

- With high throughput
- On a production capable platform
- With advanced data handling
-

Object

Provide Advanced Confocal Metrology

- With high throughput
- On a production capable platform
- With advanced data handling
- Recipes transfer from engineering system
-

Object

Provide Advanced Confocal Metrology

- With high throughput
- On a production capable platform
- With advanced data handling
- Recipes transfer from engineering system
- Yesterday…

Equipment

Integrate onto Electroglas EG6000

- "Familiar" prober platform
- Automation
- Sort Manager

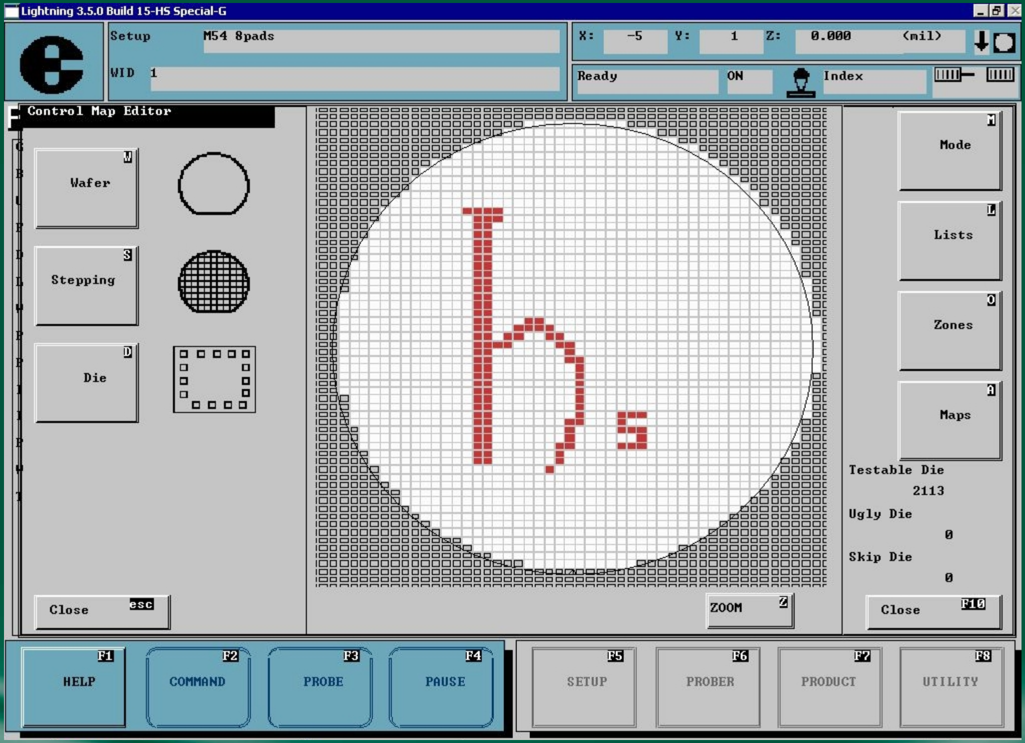
Results

Hyphenated Systems HS6000

- "Familiar" prober platform

Results

- Hyphenated Systems HS6000
  - “Familiar” prober platform
  - Automation



Lightning 3.5.0 Build 15-HS Special-G

Setup M54 8pads

WID 1

X: -5 Y: 1 Z: 0.000 <mil>

Ready ON Index

Control Map Editor

Testable Die 2113

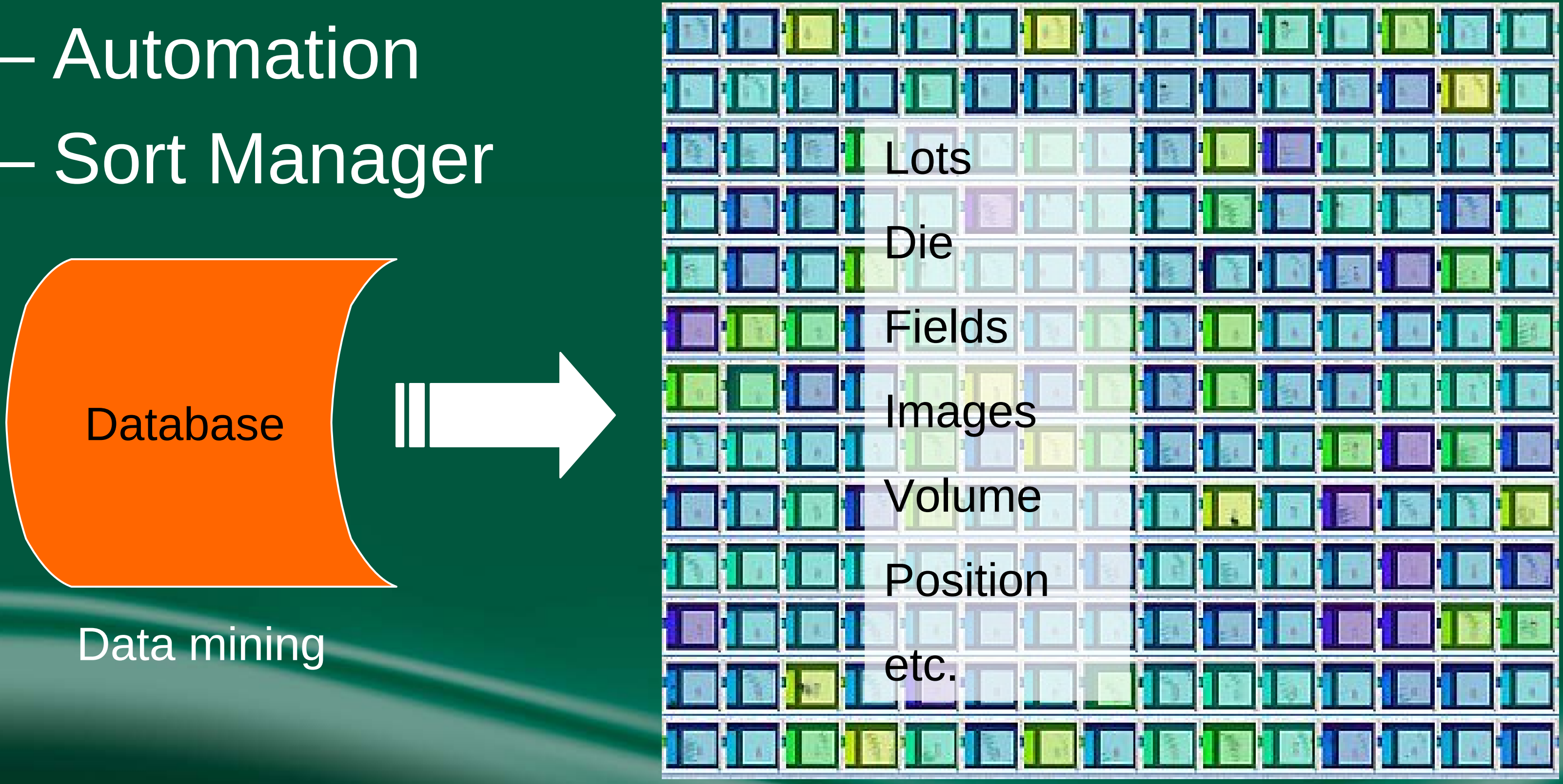
Ugly Die 0

Skip Die 0

Results

Hyphenated Systems HS6000

- “Familiar” prober platform
- Automation
- Sort Manager



Database

Data mining

Lots

Die

Fields

Images

Volume

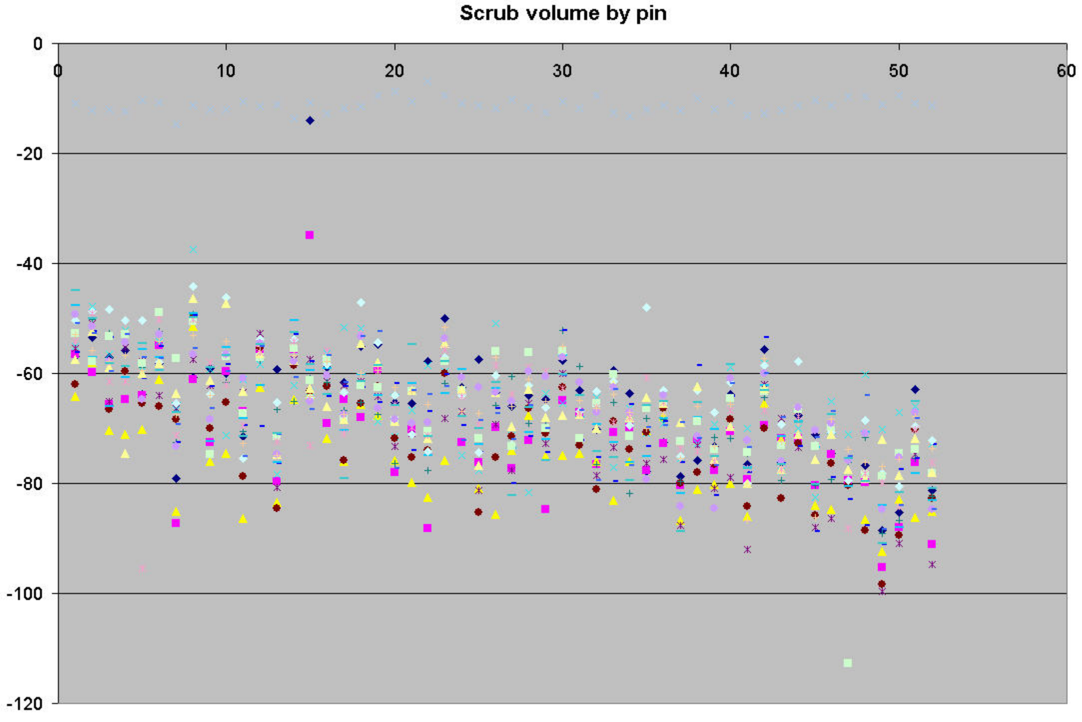
Position

etc.

Results

Hyphenated Systems HS6000

- “Familiar” prober platform
- Automation
- Sort Manager
- 3D Metrology



Future

Platform provides other interesting directions

- Probing (!)
- Temperature control

On the HS6000 platform (with VeraConnex) add

- C_{res} measurement at temperature (up to 64k pins)
- Scrub position analysis Vs opening

Thank You!

- We’ll see you in the exhibit later this week…

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