

Good to Great: How X-Ray Technology is driving yield in Advanced Packaging

GAAC Summit – Smart Mobility Forum

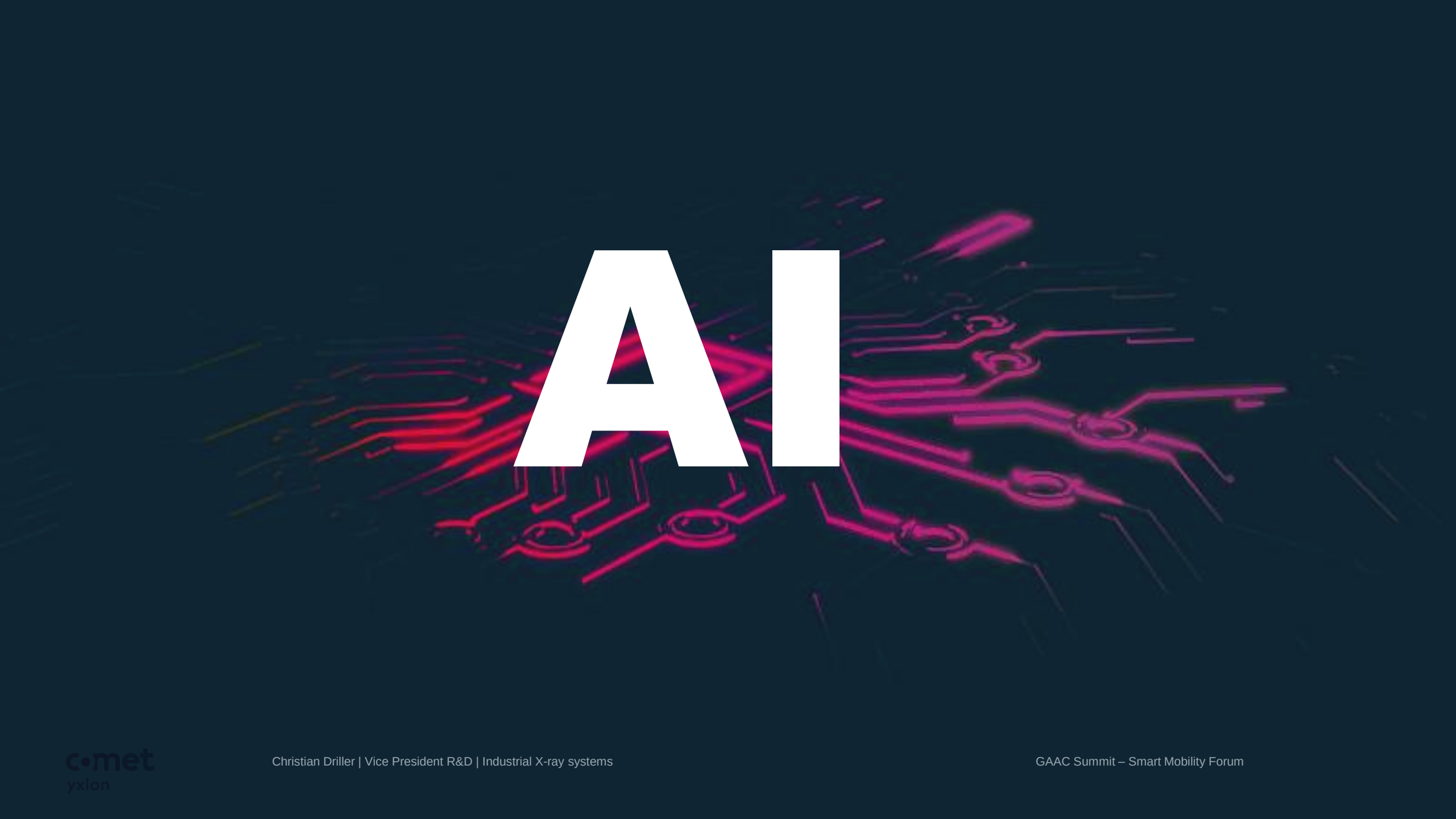
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Essener Bogen 15
22419 Hamburg, Germany

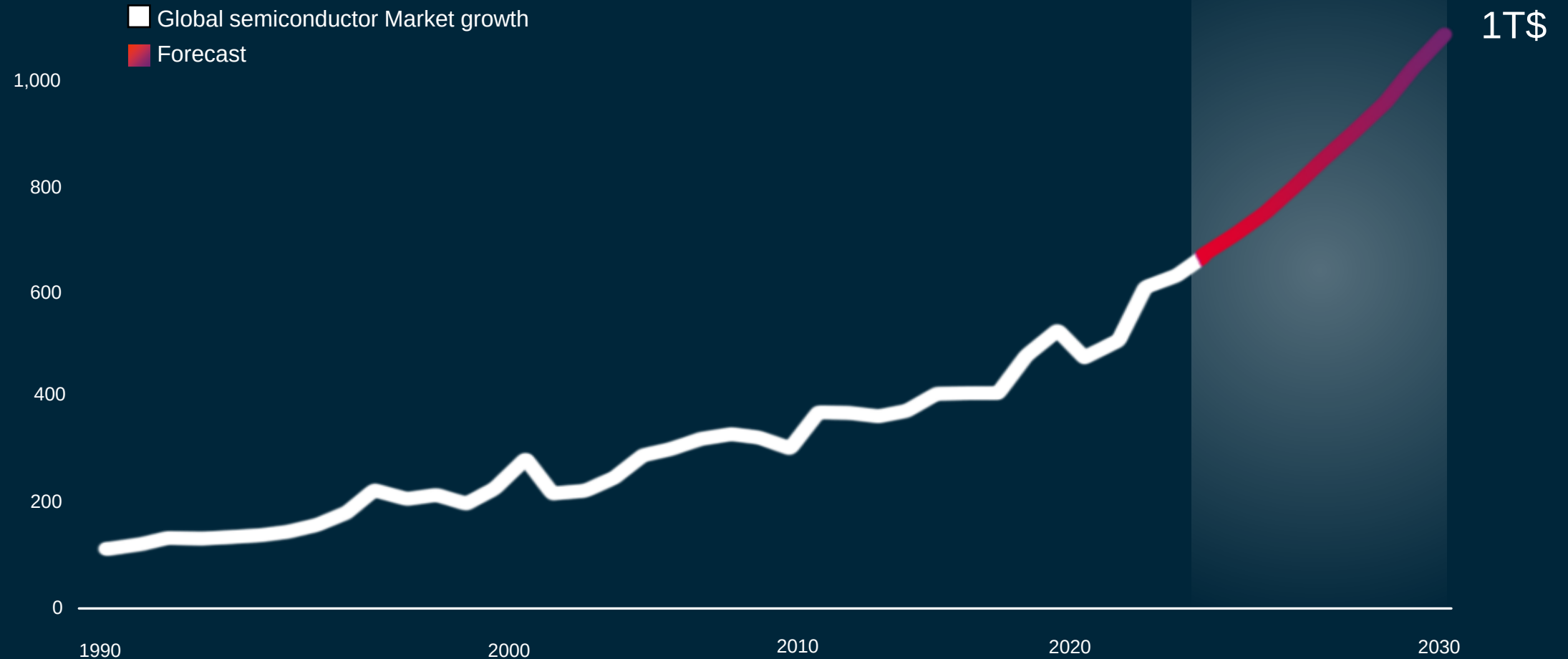
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yxlon.comet.tech

The world is going...

AI



.. and it's driving growth in the Semiconductor market



**ZERO
DEFECTS**

MARKET



**Win time-to-market
race**

TECHNOLOGY



Design for yield

MANUFACTURING

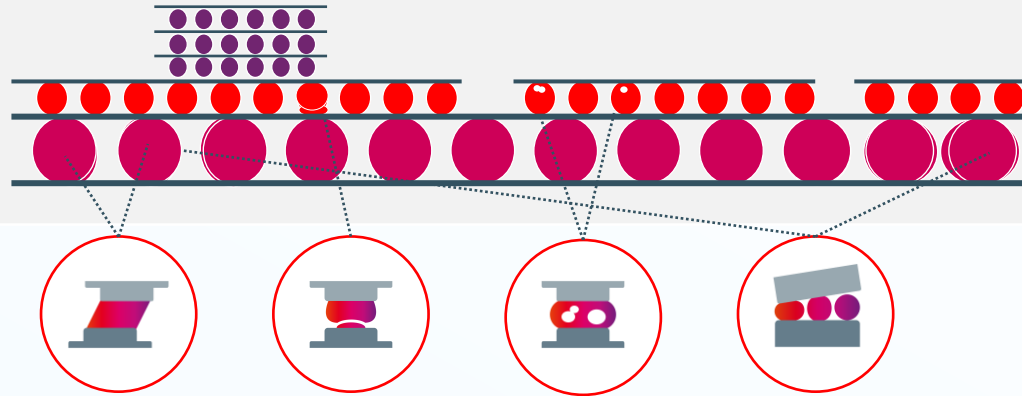


**Accelerate process
ramp-ups time**

More **INSIGHTS**

FORESIGHT

New Test Strategies



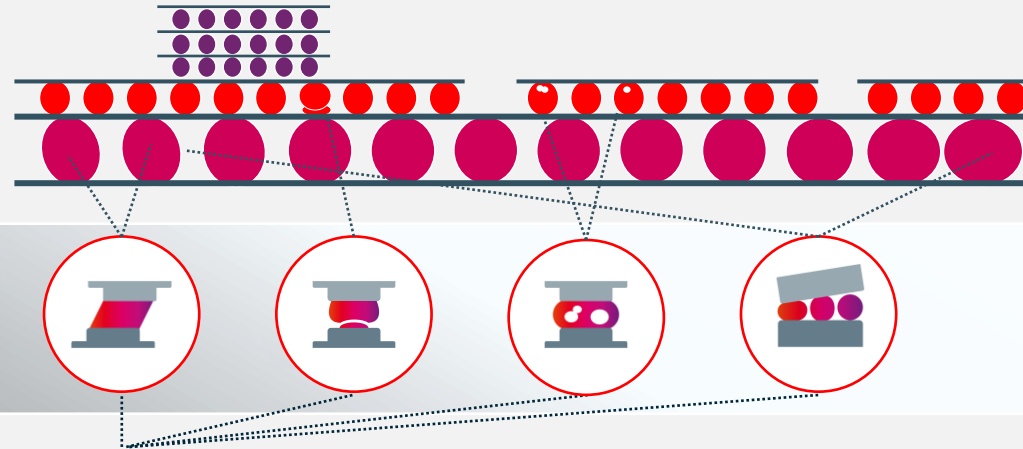
**ZERO
DEFECTS**

More **INSIGHTS**

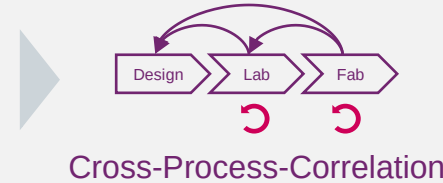
FORESIGHT

**ZERO
DEFECTS**

New Test Strategies



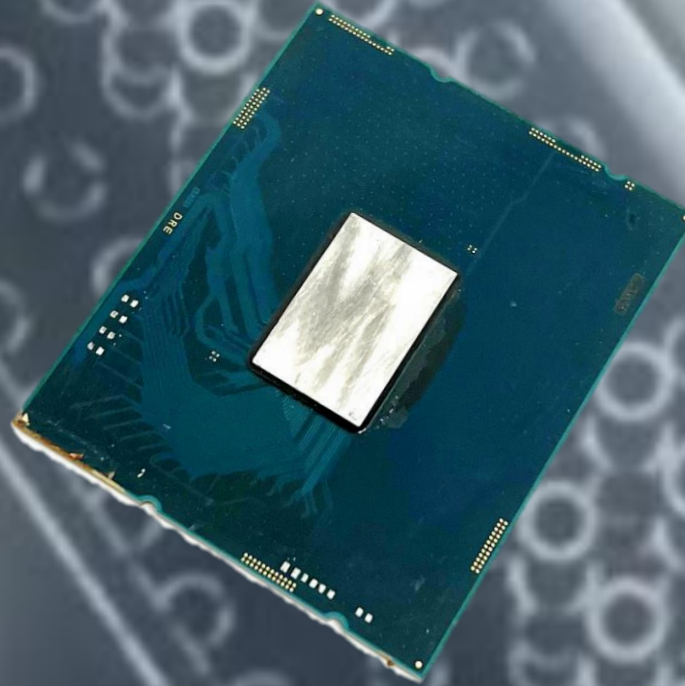
End-to-End Analytics



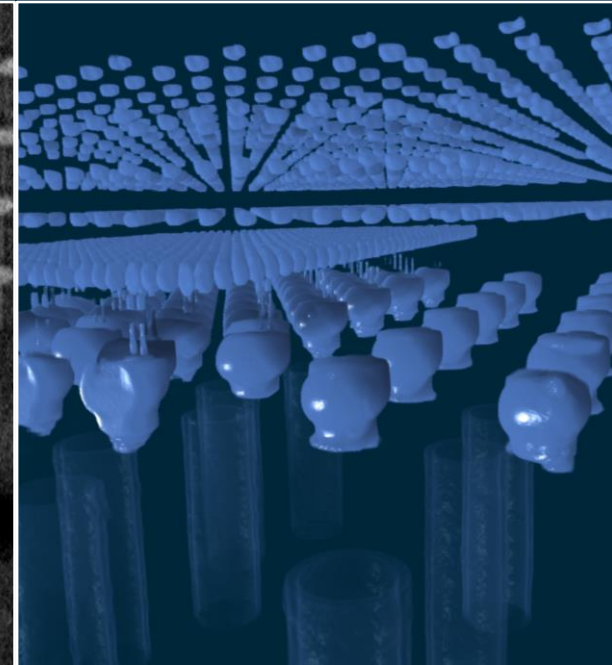
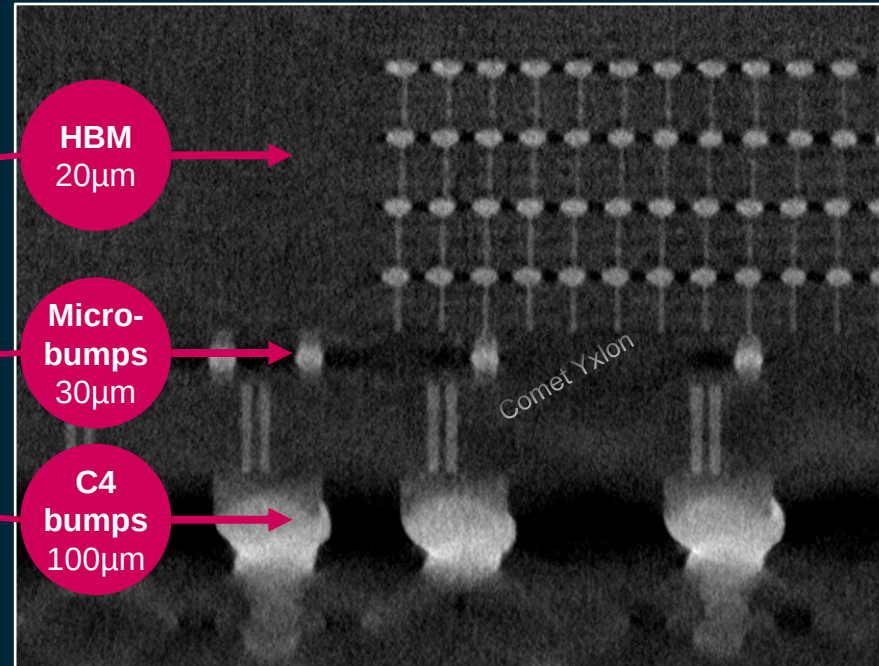
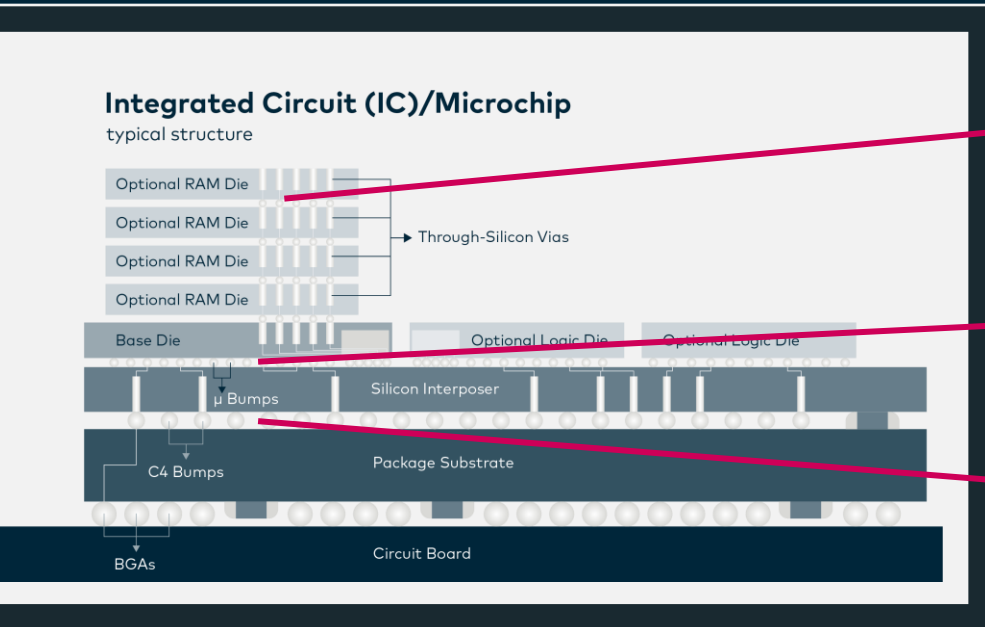
More **INSIGHTS**

FORESIGHT

Let's dive into a CPU to experience the power of X-ray



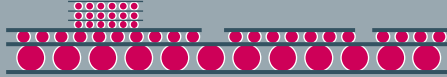
Looking at solder planes



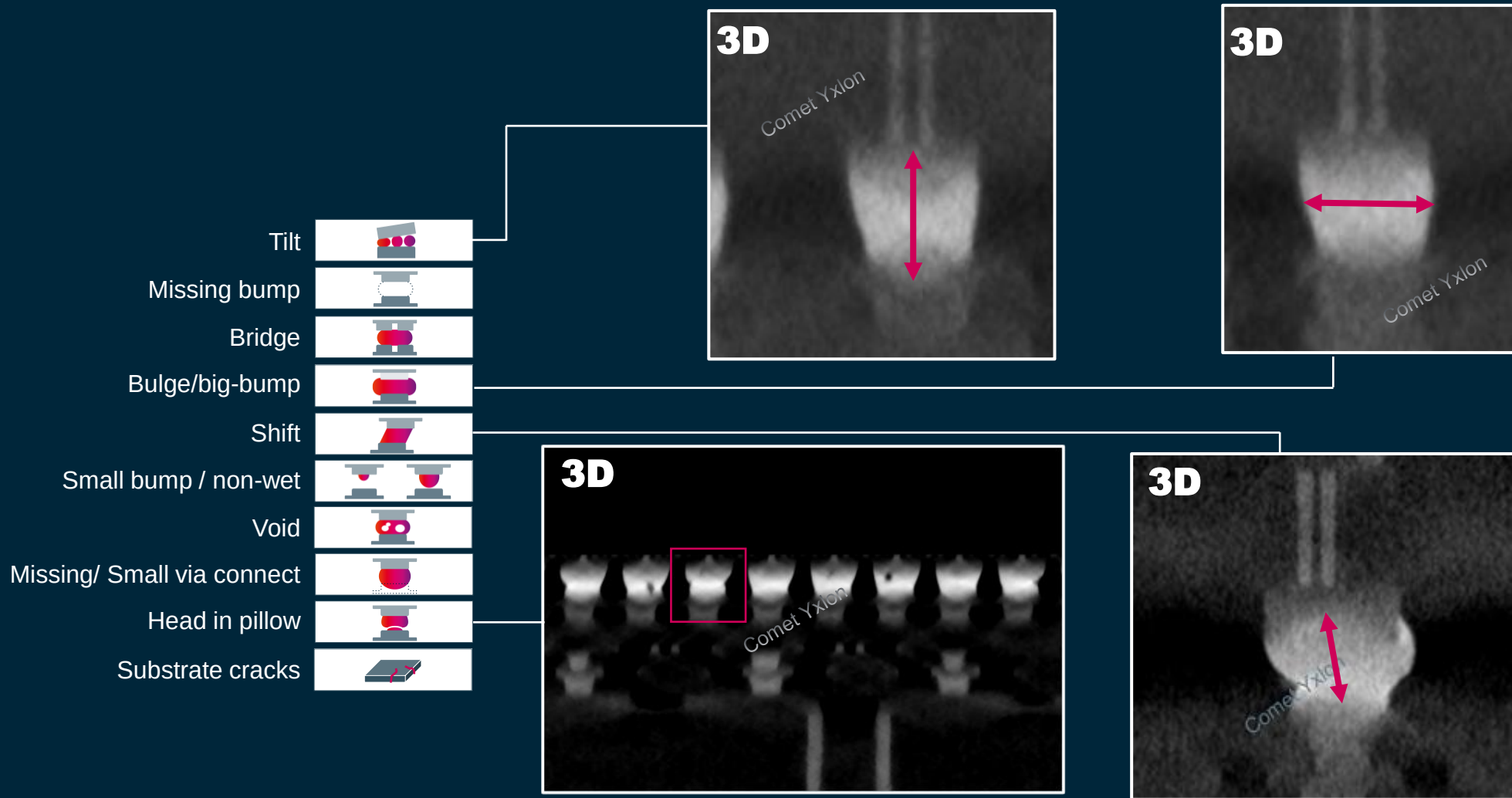
Source: All image property rights remain with Comet Yxlon and images are not to be photographed, copied or distributed

The power of Xray in advanced packaging

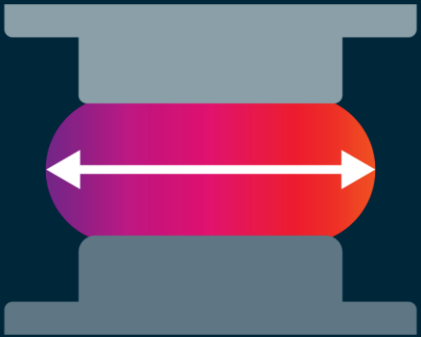
To see better. Faster. More.

Specimen: Advanced Packages		Tools for inspection / failure analysis			
		Optical	X-Ray		FIB-SEM
			2D	Next Gen 3D	
Tilt		✓	✓	✓	✓
Missing bump		✓	✓	✓	✓
Bridge		✓	✓	✓	✓
Bulge/big-bump		✓	✓	✓	✓
Small bump / non-wet			✓	✓	✓
Void			✓	✓	✓
Missing/ Small via connect			✓	✓	✓
Shift				✓	✓
Head in pillow				✓	✓
Substrate cracks				✓	✓
		Speed   Detail recognition			

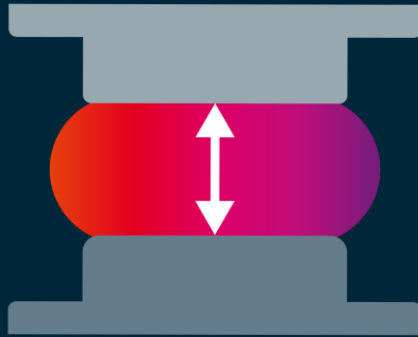
Looking at critical defects



3D Bump Metrology



Bump Size



**Stand off
Height**



**Direction and
Length of Shift**



**Head in Pillow
Ratio**

What is needed?

Clarity

See better.

Efficiency

Faster.

Insights

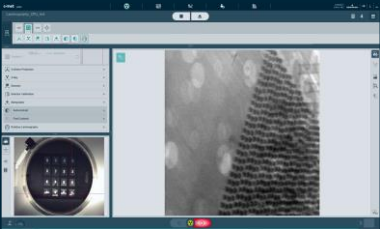

More.

AI-Based Software Platform for problem solving

Clarity

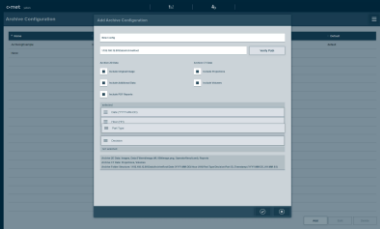
Efficiency

Insights
dragonfly



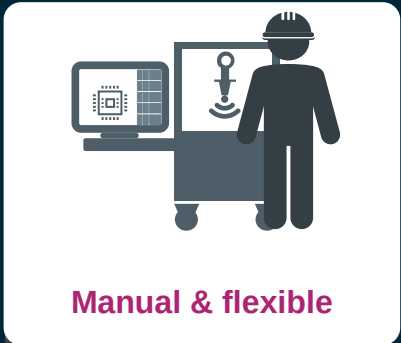
Acquisition

Xray System control for best images



Management

Manage inspection recipe and dataflow



Manual & flexible

Dragonfly 3D World

Interactive 3D visualization and analysis software



Repeatable & Reliable

ProInsight

Software-assisted inspection



Repeatable, Reliable & Cost-Efficient

DirectInspect

Fully automated inspection

See better.

Faster.

More.

From Clarity to Insights (1/3)

ProInsight

Software-
assisted
inspection



Repeatable &
Reliable

c.met yxlon 12/5/2023 3:13:42 PM

Standalone Mode

Create Job

Drag and drop files and folders here.
Files supported: Tiff, VolumeInfo
or
Browse Files...
Browse Folders...

Name	Content	Batch Mode	Inspection Type	Date
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Processed

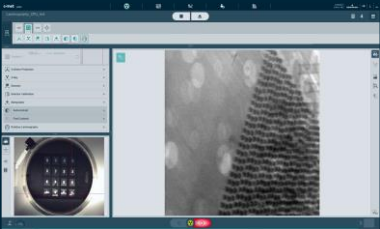
Name	Content	Batch Mode	Inspection Type	Result	Report	Date	Date Processed
cvolume.raw.volumeinfo			BumpInspect CL	✓	PDF	2023-12-05 15:10:57	2023-12-05 15:13:09
cvolume.raw.volumeinfo			BumpInspect CL	✗	PDF	2023-12-05 13:22:37	2023-12-05 13:27:15
cvolume.raw.volumeinfo			BumpInspect CL	✗	PDF	2023-12-05 12:20:53	2023-12-05 13:20:03
cvolume.raw.volumeinfo			BumpInspect CL	✗	PDF	2023-12-05 12:00:29	2023-12-05 12:08:57
cvolume.raw.volumeinfo			BumpInspect CL	✗	PDF	2023-12-05 11:12:29	2023-12-05 12:00:12
cvolume.raw.volumeinfo			BumpInspect CL	✗	PDF	2023-12-05 11:04:29	2023-12-05 11:12:24
cvolume.raw.volumeinfo			BumpInspect CL	✗	PDF	2023-12-05 10:59:03	2023-12-05 11:04:22
cvolume.raw.volumeinfo			BumpInspect CL	✗	PDF	2023-12-05 10:37:58	2023-12-05 10:43:42

From Clarity to Insights (2/3)

Clarity

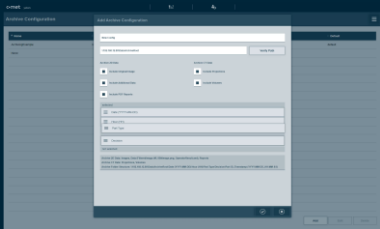
Efficiency

Insights
dragonfly



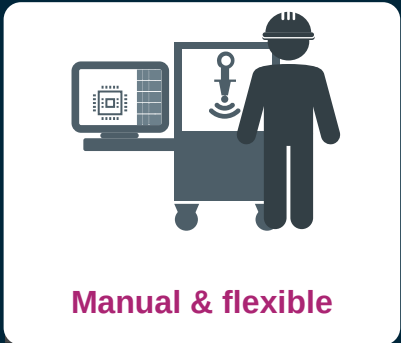
Acquisition

Xray System control for best images



Management

Manage inspection recipe and dataflow



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Fully automated inspection

See better.

Faster.

More.

From Clarity to Insights | 24/7 (3/3)



StartStop

Expand All JobsCollapse All Jobs

Clear Completed JobsCancel Incomplete Jobs

JobStep Description	Plugin	Block	JobStep	Progress	Status	Output Description	Started	Elapsed Time (s)	CPU Time (s)	Has Error	Notifications	Clear	Cancel
center v7, Pos: 1, SIN: 1			8215c58f-ca8f-ef11-b521-ec7a70796c5	Reg1, Cutter, Reg2, ROI, Segments, Merge, Features, Classif	False, True	Rejected: U0 E0 A4 R2	10/21/2024 6:35:22 PM	90.81	389.953	false			
center v7, Pos: 1, SIN: 1			1023e70d-ca8f-ef11-b521-ec7a70796c5	Reg1, Cutter, Reg2, ROI, Segments, Merge, Features, Classif	False, True	Rejected: U0 E0 A4 R2	10/21/2024 6:37:21 PM	80.5646	385.781	false			
center v7, Pos: 1, SIN: 1			2423e70d-ca8f-ef11-b521-ec7a70796c5	Reg1, Cutter, Reg2, ROI, Segments, Merge, Features, Classif	False, True	Rejected: U0 E0 A4 R2	10/21/2024 6:37:22 PM	156.822	388.063	false			
center v7, Pos: 1, SIN: 1			8223e70d-ca8f-ef11-b521-ec7a70796c5	Reg1, Cutter, Reg2, ROI, Segments, Merge, Features, Classif	False, True	Rejected: U0 E0 A4 R2	10/21/2024 6:37:23 PM	234.521	378.094	false			
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center v7, Pos: 1, SIN: 1			8908f48-ca8f-ef11-b521-ec7a70796c5	Reg1, Cutter, Reg2, ROI, Segments, Merge, Features, Classif	False, False		10/21/2024 6:41:15 PM			false			
center v7, Pos: 1, SIN: 1			b108f48-ca8f-ef11-b521-ec7a70796c5	Reg1, Cutter, Reg2, ROI, Segments, Merge, Features, Classif	False, False		10/21/2024 6:41:15 PM			false			
center v7, Pos: 1, SIN: 1			5a108f48-ca8f-ef11-b521-ec7a70796c5	Reg1, Cutter, Reg2, ROI, Segments, Merge, Features, Classif	False, False		10/21/2024 6:42:34 PM			false			

DirectInspect

Fully automated inspection

Repeatable, Reliable & Cost-Efficient

3D Metrology in a fully automated 24/7 setting

Insights

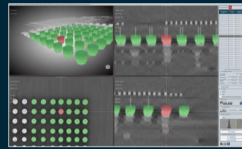
dragonfly

**Automated Defect
Classification**

Fully automated inspection

Clarity

Best image quality



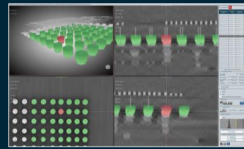
3D Metrology in a fully automated 24/7 setting

Insights



Automated Defect Classification

Fully automated inspection



Clarity

Best image quality



Efficiency

Automated material flow

EFEM loader for IC trays
(connected to OHT)

Automated data flow

Reporting and automated dataflow to customer

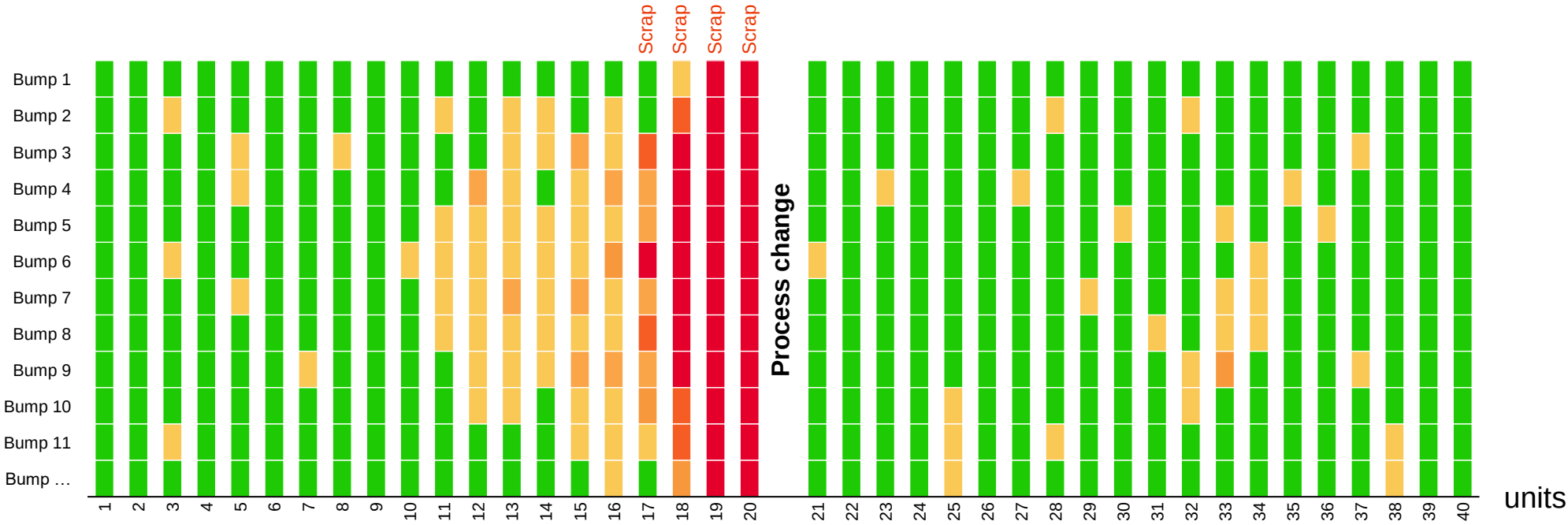
Fully Automated 24/7

From Insights to Foresight

Data



Insights for BumpInspect



From Insights to Foresight

Data

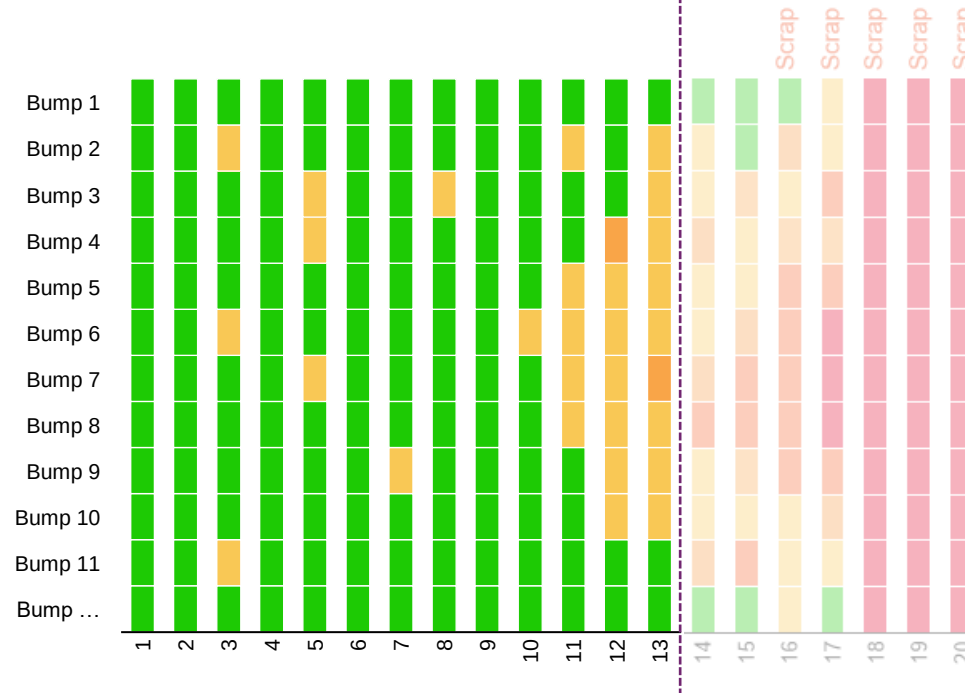


Insight ("why")
to
foresight ("when")

Insights for BumpInspect



past future
Alert prediction



From Insights to Foresight

Data

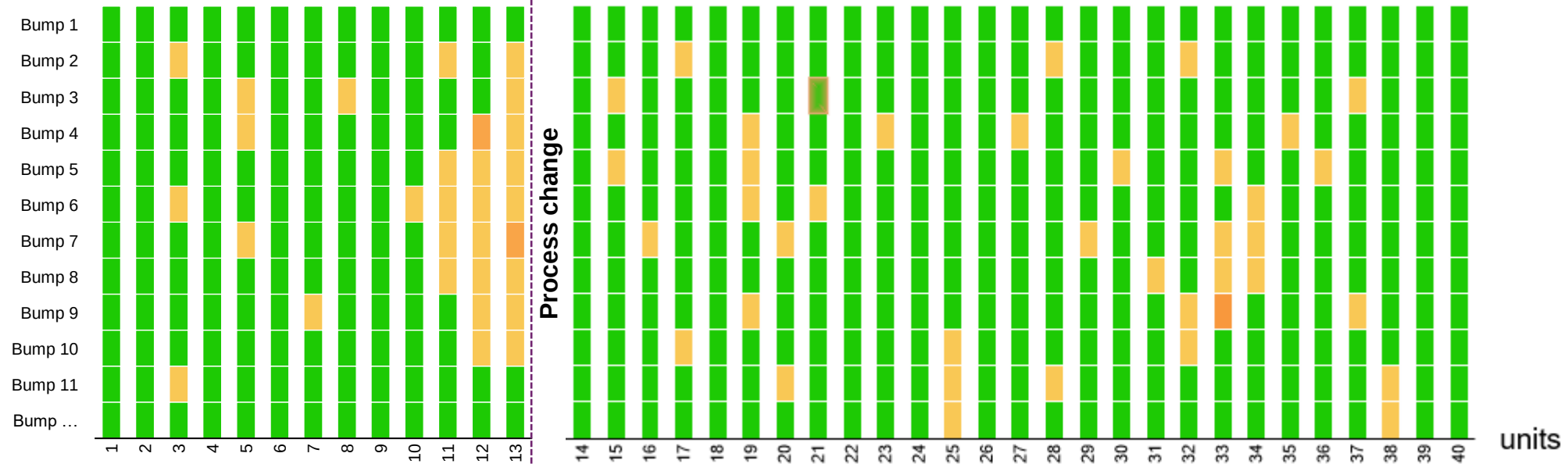


Insight ("why")
to
foresight ("when")

Insights for BumpInspect



past future
Alert prediction



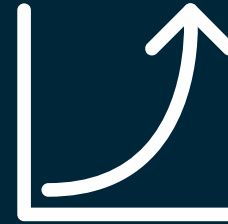
Key take-aways – Benefits of 3D X-Ray for Advanced Packaging



**Fast and easy insights
on structural defects**



**Widest defect capture
with 3D X-ray inspection**



**Increase yield and
save costs**



**Faster process
introduction**



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Thank you for your attention.

Please feel free to contact me if you have
any questions or visit us at booth **C2.555.**



Christian Driller
Vice President R&D

christian.driller@comet.tech

The Comet Yxlon logo is displayed on a white, angled sign. The word 'comet' is in a bold, pink, lowercase sans-serif font, and 'yxlon' is in a bold, red, lowercase sans-serif font below it. The sign is mounted on a dark blue base.

comet
yxlon

c•met
yxlon