
SEVENTEENTH ANNUAL
BiTS
TM
Burn-in & Test Strategies Workshop
March 6 - 9, 2016
Hilton Phoenix / Mesa Hotel
Mesa, Arizona
Archive- Session 6
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Session 6

Jason Mroczkowski
Session Chair

BiTS Workshop 2016 Schedule

Performance Day

Tuesday March 8 - 1:30 pm

Cell-ebrating Test

"Vision Assist Method for Common Change Kit"

Brad Emberger, Zain Abadin – Advantest

"Test Cell Thermal Solution"

Gianluca Lombardi - Advantest

"Testing Magnetic Sensors"

Paul Ruo - Aries Electronics, Inc.

Larre Nelson - Kita USA

"Magnetically shielded test-cell for an integrated fluxgate sensor"

Gert Haensel - Texas Instruments

Loren Hillukka - Johnstech International Ltd.

BiTS Burn-in & Test Strategies Workshop 2016

Vision Assist Method for Common Change Kit

Zain Abadin

Brad Emberger

Advantest

2016 BiTS Workshop
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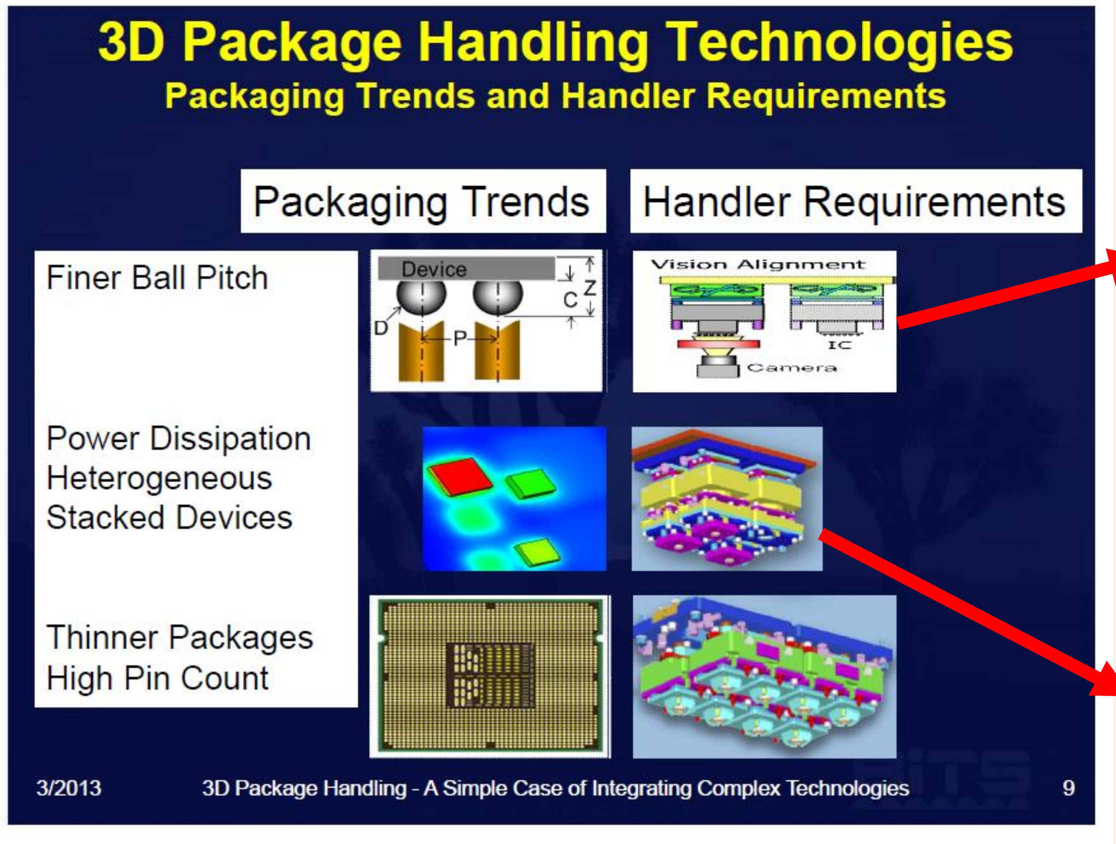
A paper from past ....



This Paper

Next paper : Thermal Control

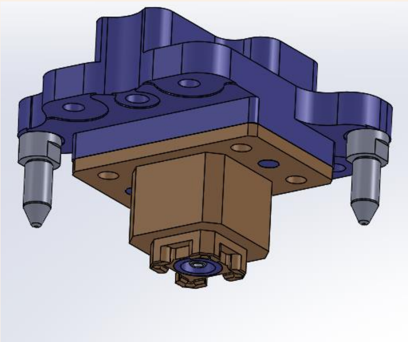
Contents

- Mechanical vs Vision Alignment
- Why Vision Alignment?
- Target Applications
- Common Change Kit
- Examples of Cost Savings
- Conclusions

Mechanical vs Vision Alignment

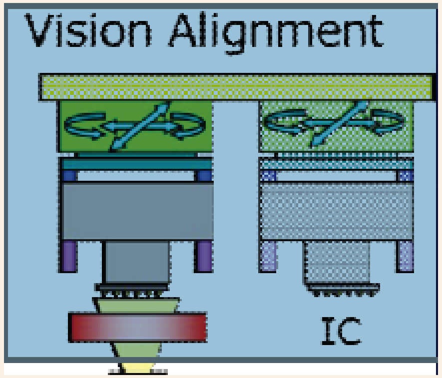
Mechanical Alignment

- Uses guide pins and precision features to align parts together
- Mechanical features wear out and require replacement
- Tolerance is limited by machining capabilities, device tolerances and life of hardware



Vision Alignment

- Uses a Camera to determine device location
- Chucks can individually adjust aligning the device to socket
- Tolerance limited by camera resolution



Vision Enables …

Fine Pitch Packages

0.35, 0.30, 0.25 Pitch Capable

Thin Packages

Vision = No edge Damage

Lidded Packages

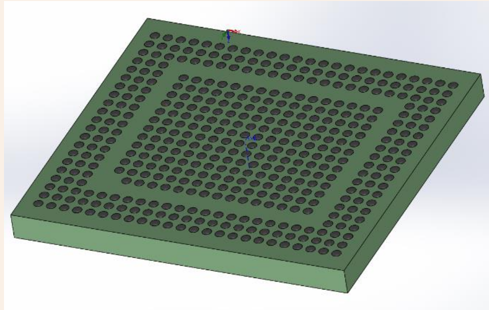
Offset lids, poor edge alignment

Kit-Less Operation

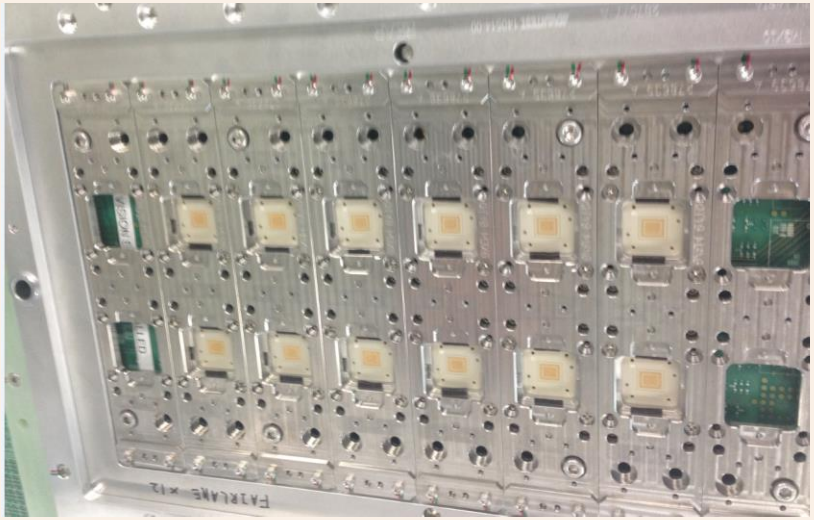
Use a common kit for multiple package sizes

Fine Pitch Packages

- Production Proven Technology
- Demonstrated > 99% yield on X12
  - Device pitch = 0.35 pitch
  - Vision "on the fly" alignment

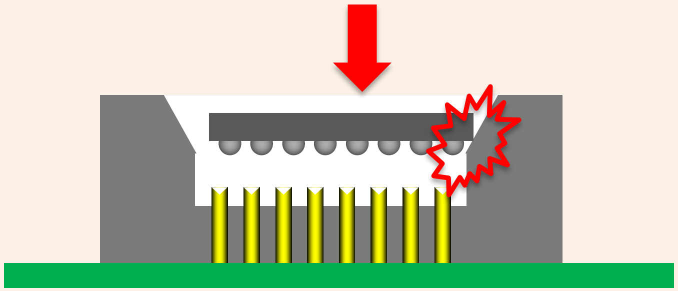


254 devices	
Site1	100%
Site2	100%
Site3	100%
Site4	100%
Site5	100%
Site6	100%
Site7	100%
Site8	100%
Site9	100%
Site10	100%
Site11	100%
Site12	100%

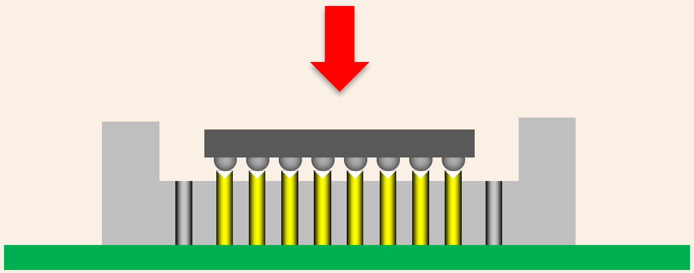


Thin Packages – No Edge Contact

- Traditional Mechanical Alignment Socket physically guides device to final position
  - Mechanical alignment method = Edge contact, concern of substrate damage
  - Vision alignment = No edge contact



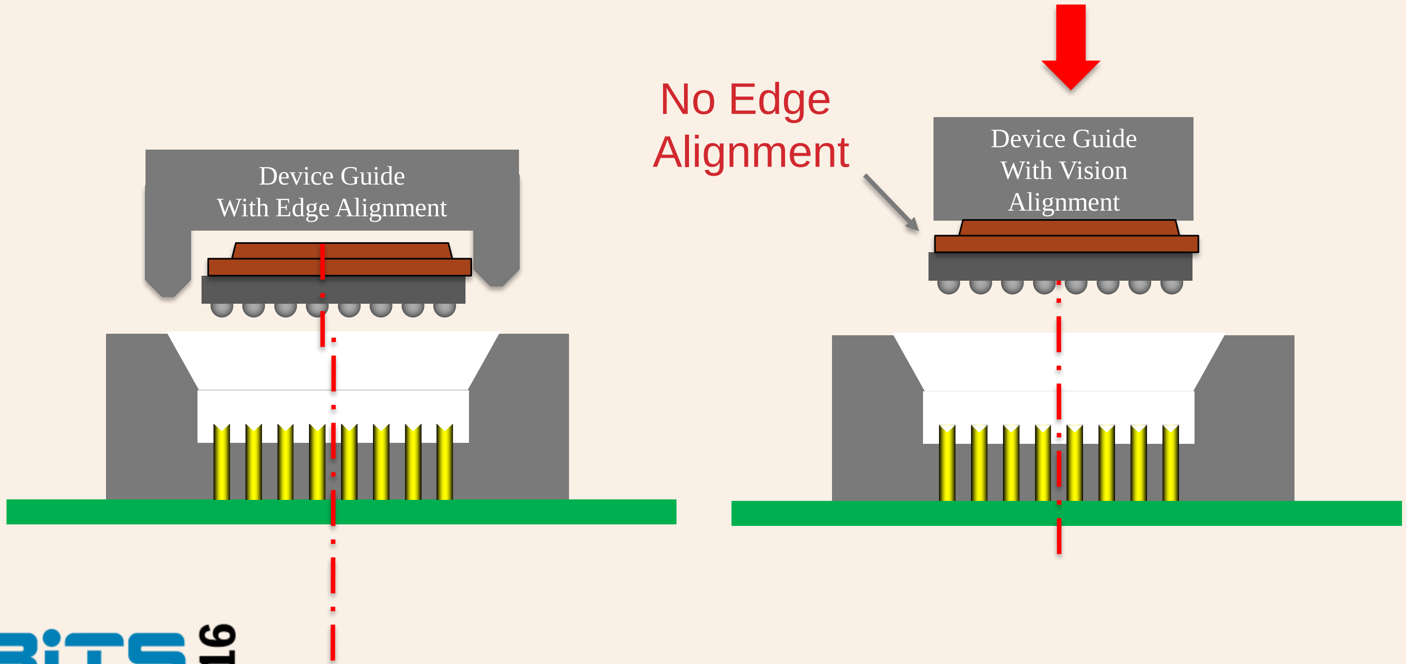
Mechanical Socket



Vision Socket

Devices with poor edge alignment

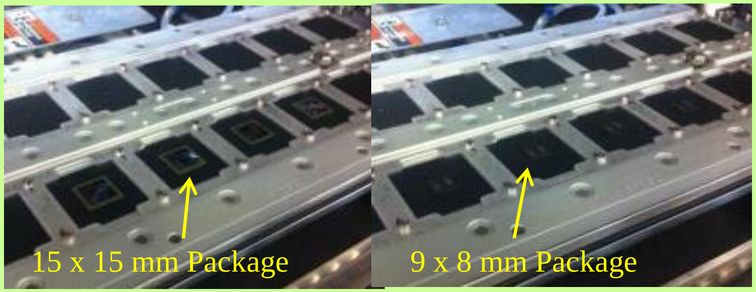
- Devices with poor edge alignment include:
  - Shifted lids
  - Punched devices



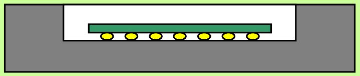
Common Change Kit Solution

Common CK advantages

1. Minimize set-up time
2. Minimize CK cost
3. Reduce CK storeroom needs

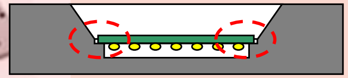


Common CK



NO custom device kits

Pocket Alignment CK



Package Size	Heat Plate	Buffer Plate	Contact Chuck
Small	Common	Common	S Type
Medium			M Type
Large			L Type

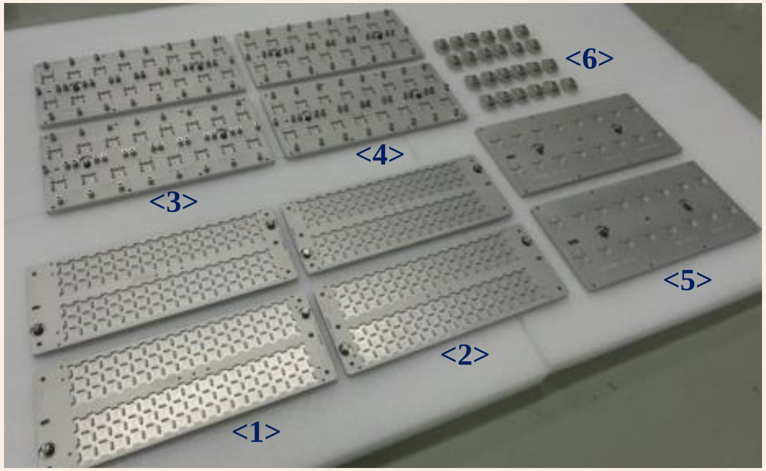
Cost Savings with Common Change Kits

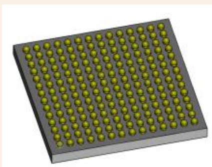
- Major Cost Savings Include:
  - Eliminate new change kit costs
  - Greatly reduce change over time
  - Reduced inventory space & hardware management
  - Simplify component design
    - Lower cost
    - Shorter lead times

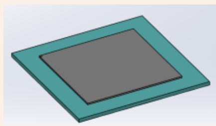
Mechanical Change Kits

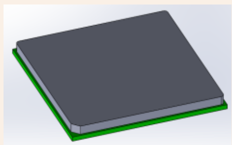
- Traditional Change kits require one kit for each package size
- This requires a large number of different kits

No.	Unit name	Qty	
		X8	X16
Device Change Kit			
1	Heat plate	2	2
2	Unsoak plate	2	2
3	Buffer plate LD	2	2
4	Buffer plate UL	2	2
5	Moving plate	2	2
6	Contact Chuck	16	32









Kit Hardware Annual Cost Savings

Example 1:

10 Systems: ~ 179K Savings

Example 2:

100 Systems: ~ 1.8M Savings

Change Kit Costs					
Assumes 4 kits per system					
		10 Systems		100 Systems	
Test Site	~ Kit Cost	4 kits/system		4 kits/system	
	Cost	Kits	Cost	Kits	Cost
X2	$3,000	15	$45,000	150	$450,000
X4	$6,000	12	$72,000	120	$720,000
X8	$10,000	8	$80,000	80	$800,000
X16	$18,000	5	$90,000	50	$900,000
Total		40	$287,000	400	$2,870,000

Change Kit Costs - Vision					
Assumes 1.5 kits per system					
		10 Systems		100 Systems	
Test Site	~ Kit Cost	1.5 kits/system		1.5 kits/system	
	Cost	Kits	Cost	Kits	Cost
X2	$3,000	6	$18,000	65	$195,000
X4	$6,000	4	$24,000	45	$270,000
X8	$10,000	3	$30,000	25	$250,000
X16	$18,000	2	$36,000	15	$270,000
Total		15	$108,000	150	$985,000

Reduced Labor Costs

Reduced

- Labor Costs
- Down Time

Change Over Costs - Mechanical								
Assumes 2 hrs/ Change & $30/hr labor								
	10 sys	*100 Sys*	*10 sys*	*100 Sys*	*10 sys*	*100 Sys*	*10 sys*	*100 Sys*
Kit changes / week	1		3		5		7	
Weekly	$600	6K	1.8K	18K	3K	30K	4.2K	42K
Annual Costs	31K	312K	93K	936K	156K	1,560K	218K	2,184K

Change Over Costs - Vision								
Assumes 0.5 hrs/ Change & $30/hr labor								
	10 sys	*100 Sys*	*10 sys*	*100 Sys*	*10 sys*	*100 Sys*	*10 sys*	*100 Sys*
Kit changes / week	1		3		5		7	
Weekly	$150	$1,500	$450	$4,500	$750	$7,500	$1,050	$10,500
Annual Costs	$7,800	$78,000	$23,400	$234,000	$39,000	$390,000	$54,600	$546,000

Improved OEE

Shorter Time to Market

Improved Kit Management

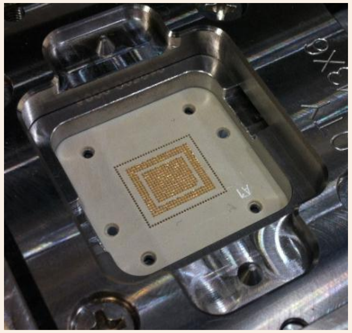
- Storage – Reduced storage space, common hardware stays on the handler
- Procurement - Fewer skews to purchase and manage

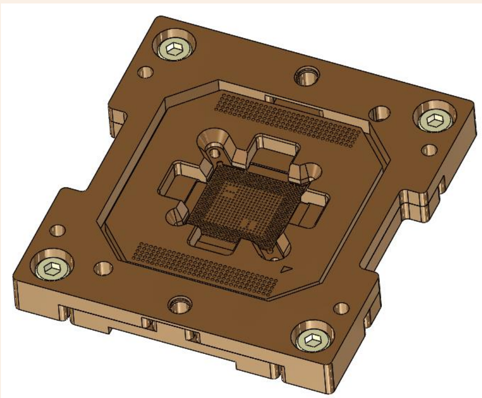
Package Size	Heat Plate	Buffer Plate	Contact Chuck
Small (Tall)	Common	Common	S Type
Medium (Grande)			M Type
Large (Venti)			L Type

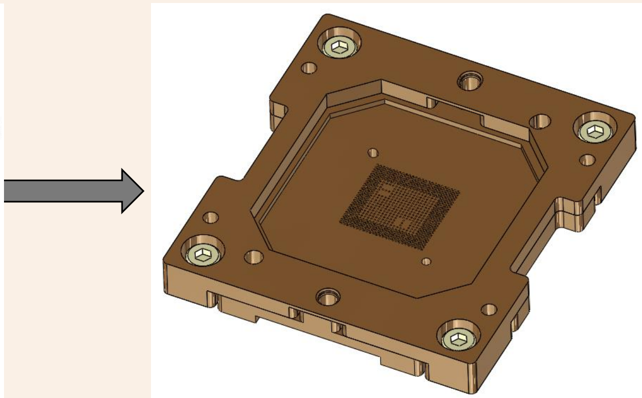
Simplified Design… Sockets

Fine tolerance socket features are eliminated reducing socket cost

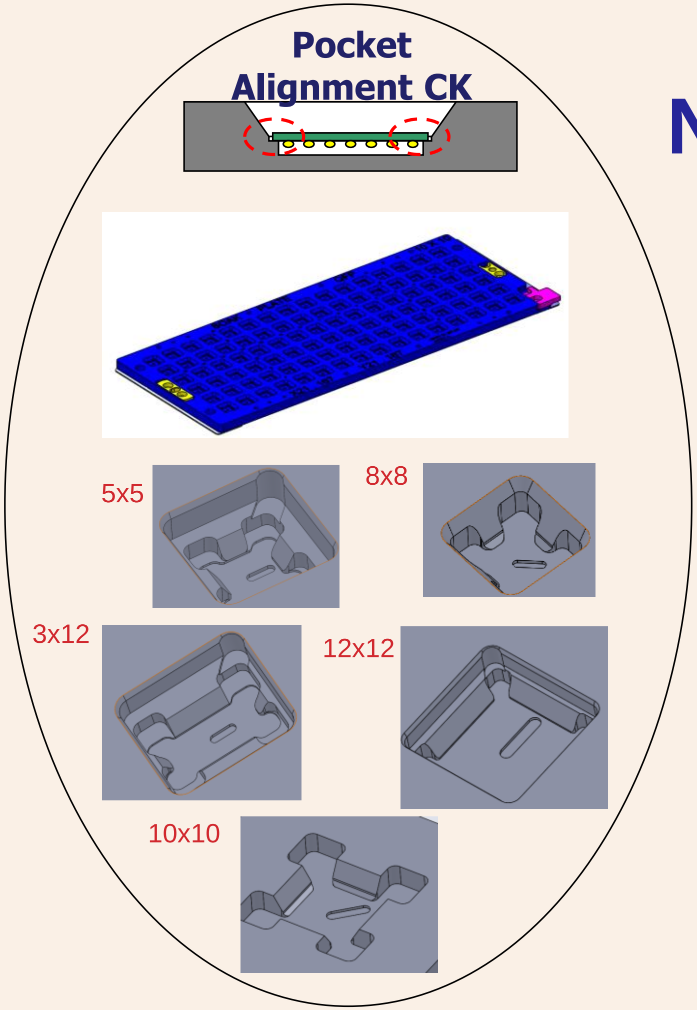
- Reduced design time
- Reduced manufacturing time
- Reduced maintenance - No alignment features to wear out

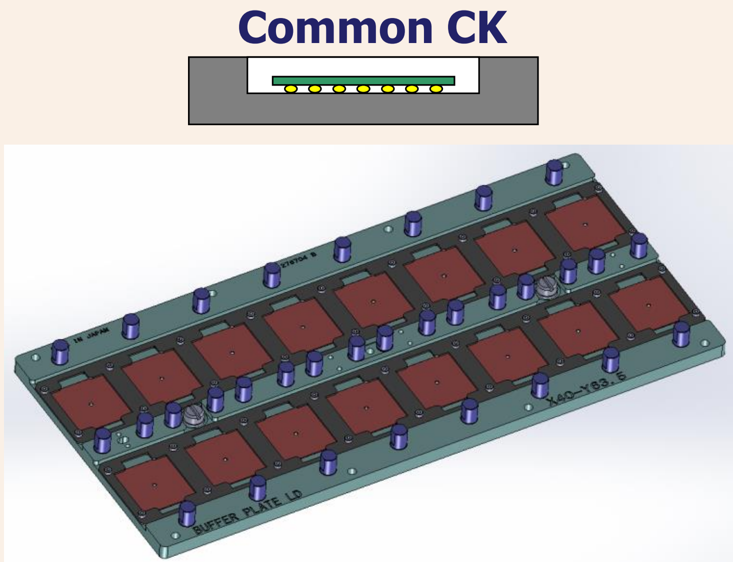






Simplified Design…
No Alignment Pockets





*No Device Measurement

*No Precision Machined Pockets

* One Size Fits All Parts

Conclusions

- Vision delivers significant cost reductions by using common hardware across multiple package sizes and types.
- Beyond cost of the initial hardware, and OEE improvements, significant savings can be realized in reducing management cost including: procurement, storage, instillation/de-instillation of kit on the system
- Vision is an enabling technology for handling fine pitch & thin substrate high performance packages to support the increasing future demands of consumer electronics