

2.5D/3D Supply Chain Integration Between Foundry and OSAT

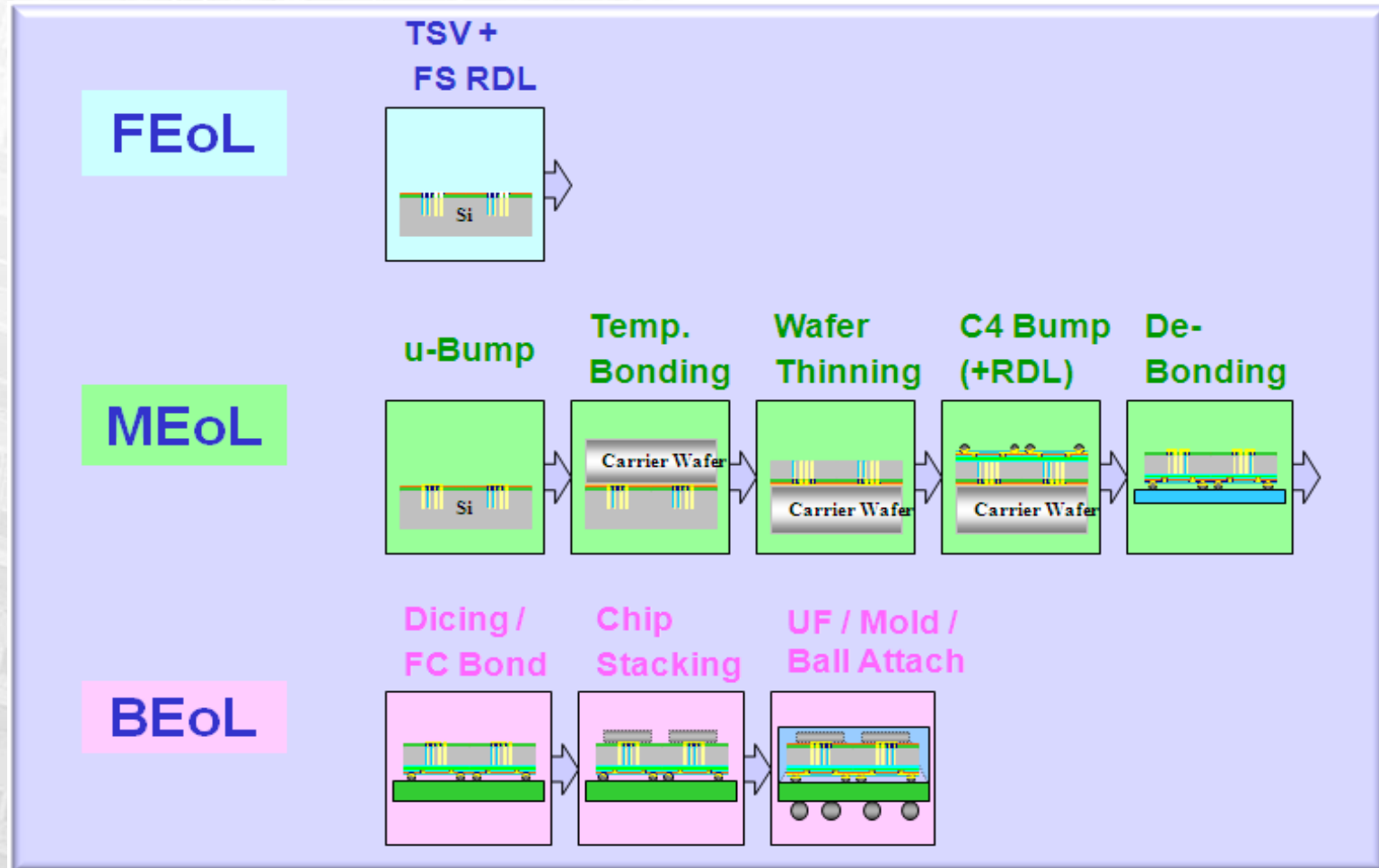
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Customer-Driven Foundry Solutions

Example 2.5D Stacking Flow

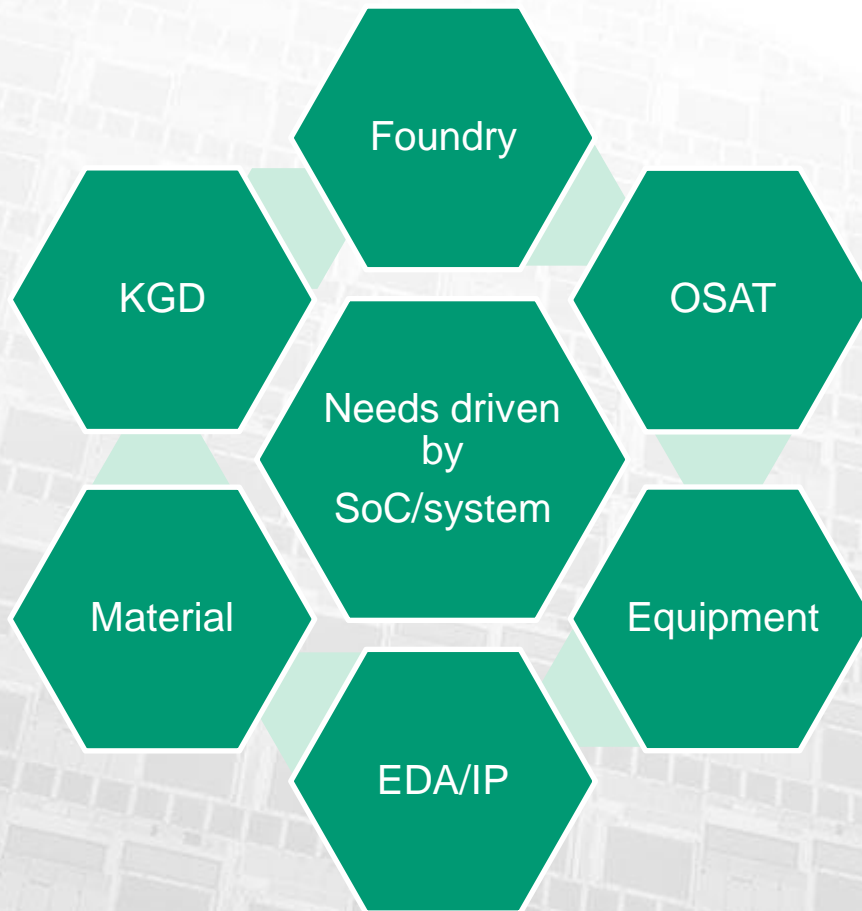


Various Work Models

		FEOL		MEOL		BEOL	
		Logic	TSV + FS RDL	Wafer Thinning	BS RDL + Bump	Assembly	Test
2.5D	OSAT MEOL		Foundry	OSAT			
	Foundry MEOL		Foundry			OSAT	
	Foundry Turnkey		Foundry				
3D	OSAT MEOL	Foundry		OSAT			
	Foundry MEOL	Foundry			OSAT		
	Foundry Turnkey	Foundry					

- Service scopes distinguished by MEOL inclusion
 - Consult your foundry/OSAT
- Work flow optimization may depend on BOM cost, stack recipe and test strategy

Innovations by Open Eco-System



- Wafer thinning and handling
- Thermal/stress consideration
- Testability
- Reliability
- 3D EDA tool
- Seamless business model
- Cost
- ...

Evolution Of the Supply Chain

Module
Development



Integration



Optimization



Diversification

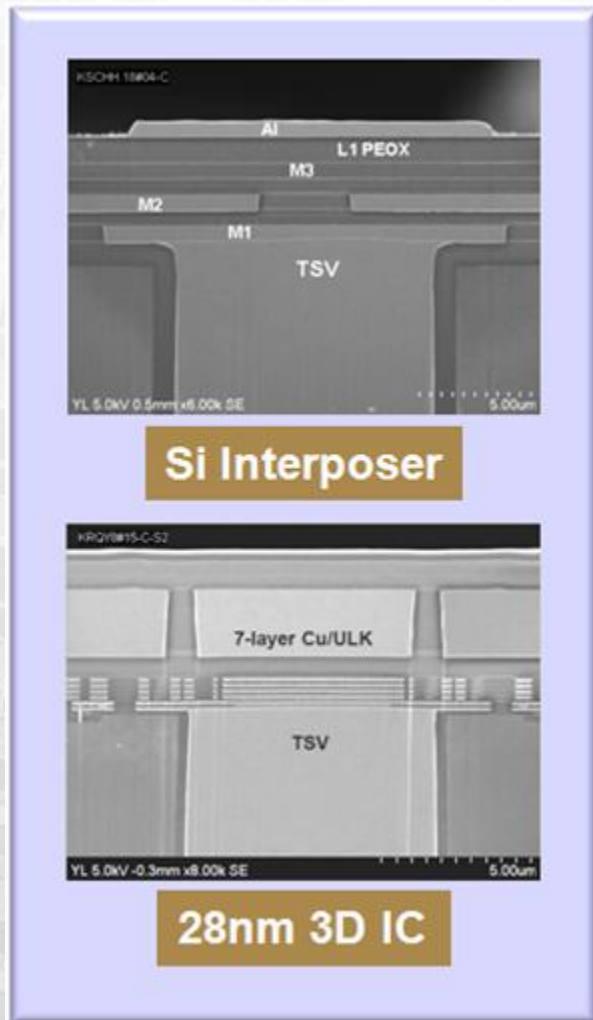
- Technology exploration
- Feasibility study


- Interface definition
- Handover criteria

- Model convergence
- Flow standarization
- Cost down

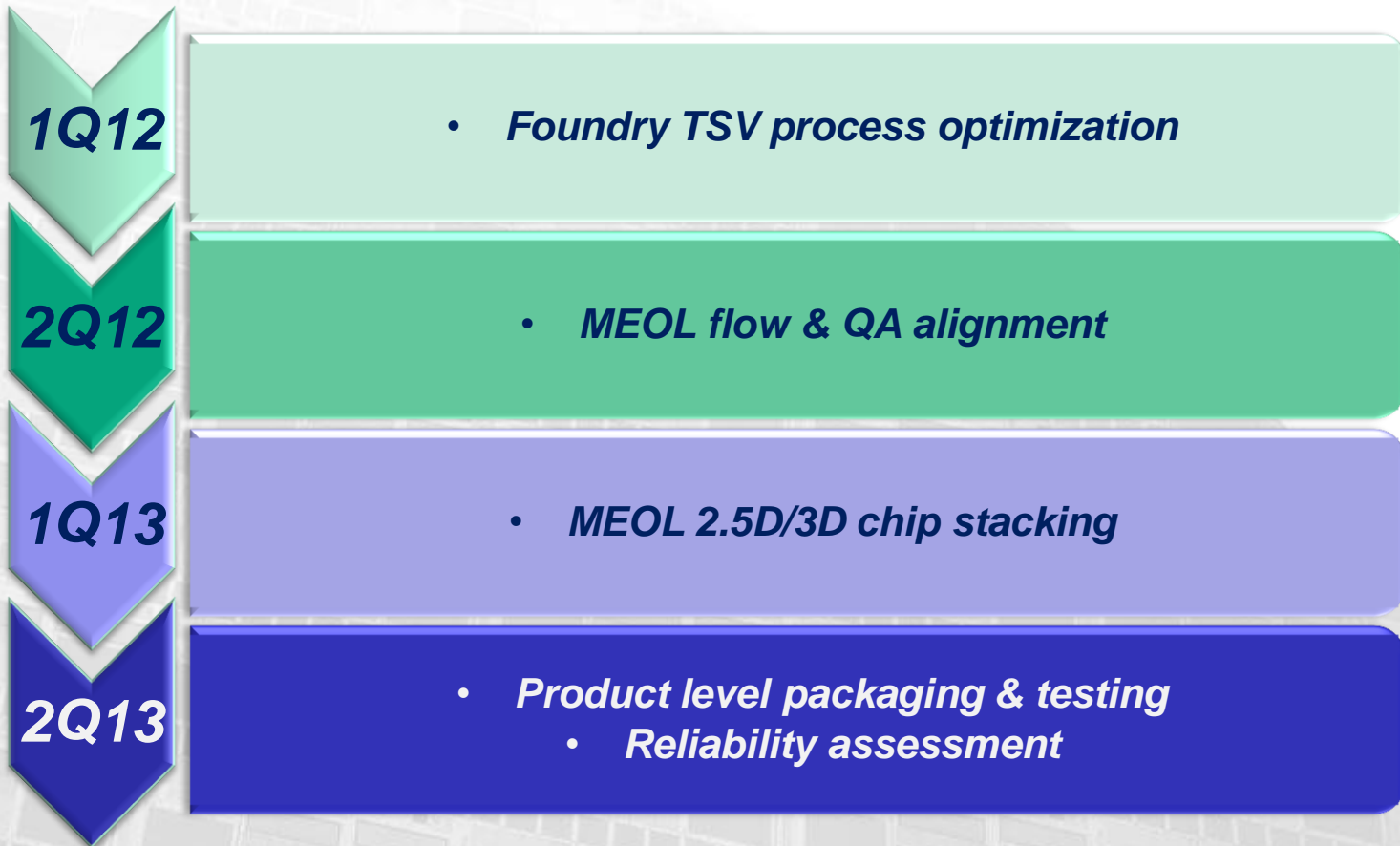
- Service differentiation
- Further innovation

UMC TSV Foundry Service



- World's first dedicated 2.5D TSI foundry capacity under Open Ecosystem
 - UMCi aggressive ramp, 1K/m now -> 14K/m 2015
- World's first 3D IC developed under Open Ecosystem 
 - UMC 28nm TSV FEOL + STATSChipPAC MEOL/BEOL
 - Wide IO memory + AP testchips, package level reliability success

UMC Ecosystem Effort



Summary

■ *Ecosystem work flow*

- Typical foundry/OSAT engagement flow applies for both 2.5D/3D, among other models

■ *Foundry TSV next step: ecosystem focus*

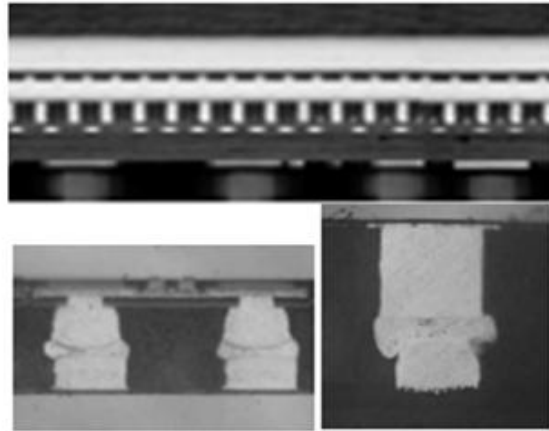
- Product level reliability assessment
- 3D package level reliability demonstrated in open ecosystem model
- EDA collaboration for emerging 3D tools

Thank you for your attention!

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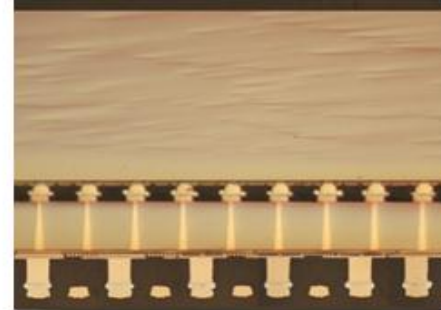
3D IC Reliability Test Results

■ Packages Reliability Test: Pass

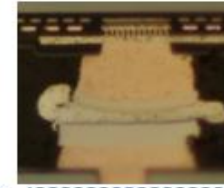


Chip to Chip

Chip to Sub



Chip to Sub



Chip to Chip

■ Reliability Performance

Reliability Test Type		Results	Performance Data	
			FT(O/S)	SAT
EOL			0/405	0/405
Reliability	MSL2aa	Pass	0/135	0/135
	MSL3	Pass	0/270	0/270
	HAST 192hrsw/ MSL3	Pass	0/135	0/135
	TC 1000x w/ MSL3	Pass	0/135	0/135
	HTST 1000hrs	Pass	0/135	0/135

Source: STATSChipPAC, produced for Joint Presentation with UMC