

Die Products Consortium

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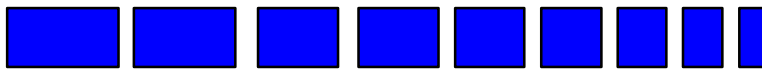
Larry Gilg

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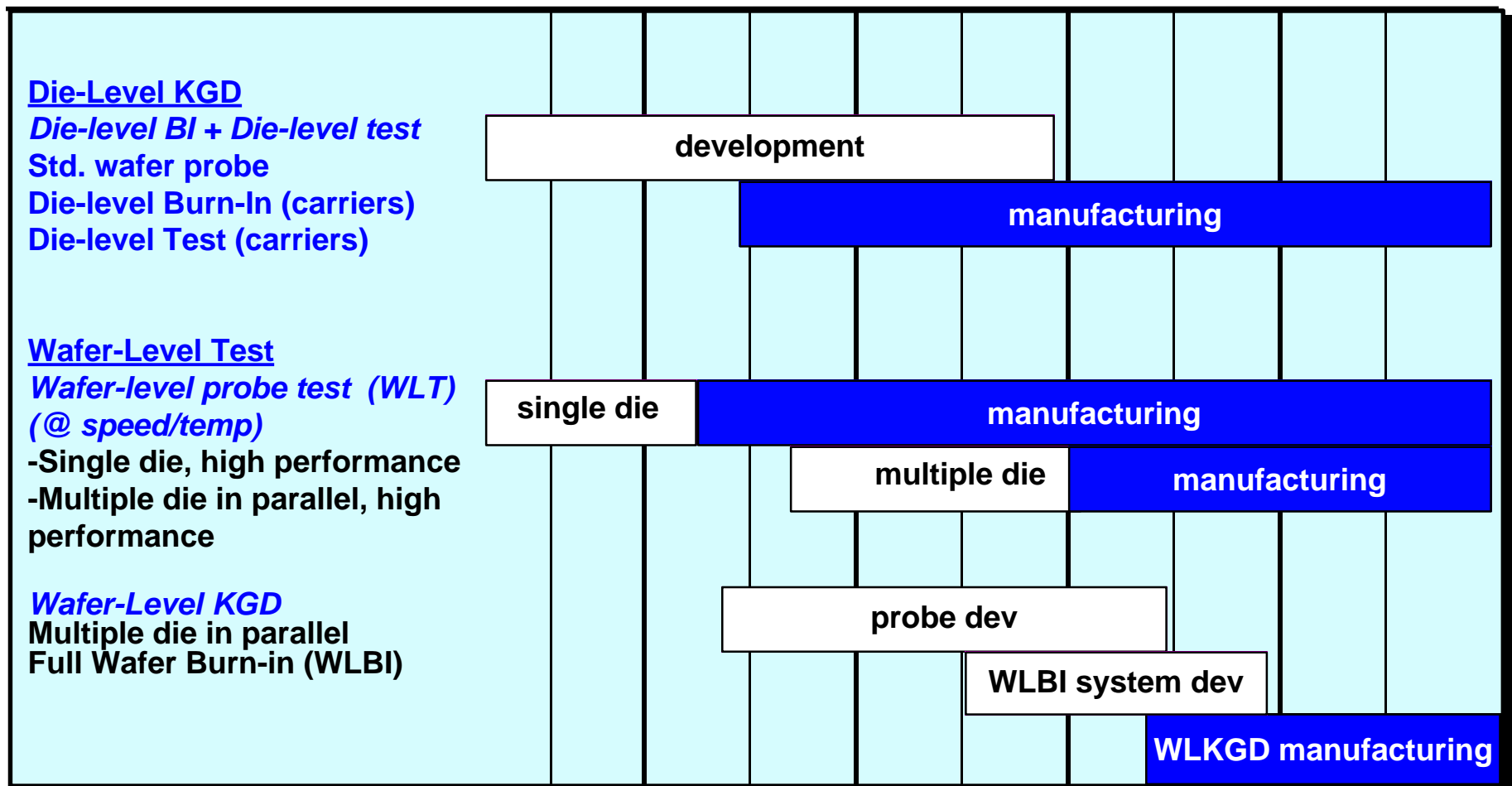
Austin, Texas

(512)338-3748

KGD Industry Roadmap

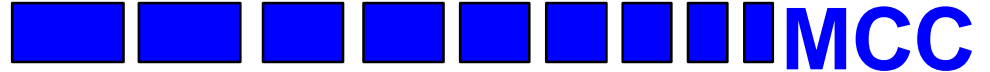
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1992 1994 1996 1998 2000



KGD Status

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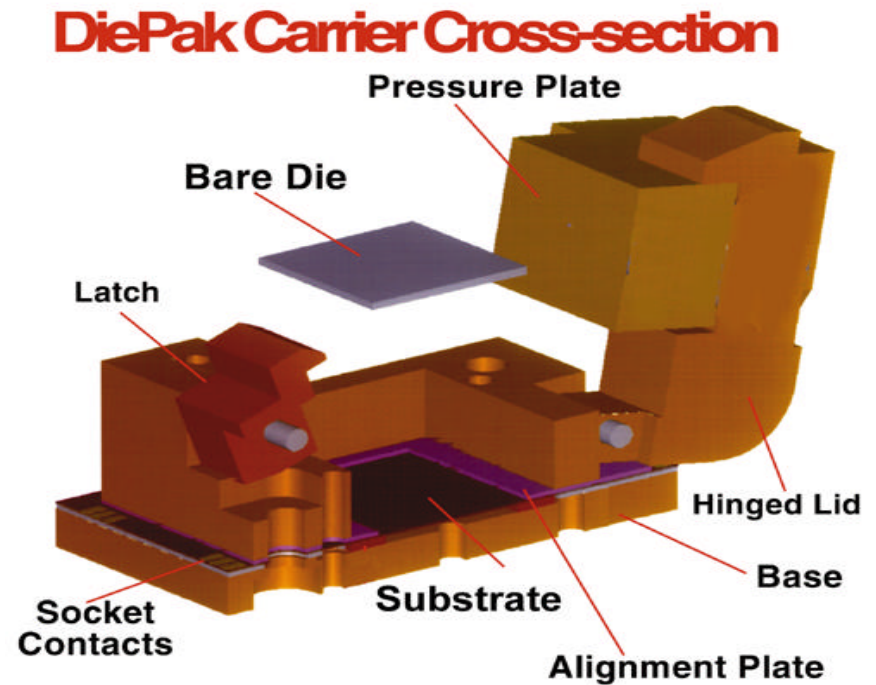
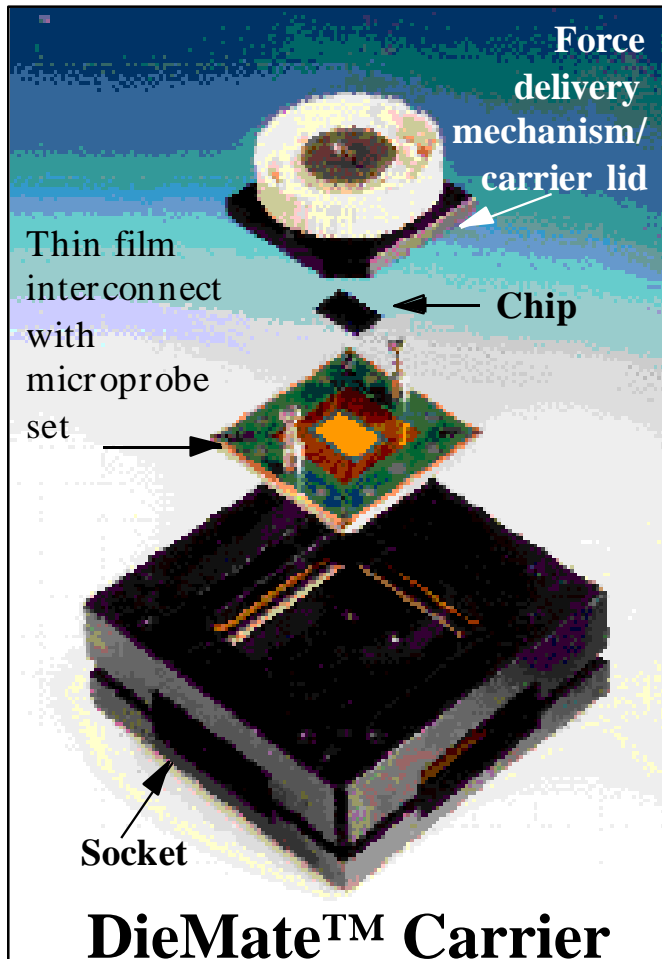


- Technology is available to support KGD now
 - Carriers provide reliable contact throughout BI/test
 - At-speed performance final testing (same issues as package)
- Infrastructure to support bare die still immature
- Many IC manufacturers have active KGD programs
 - More added each year
 - Strategic alliances with customers
 - Captives may account for more volume than open market
 - » HP, Delphi Delco
- Move to flip chip is driving increased interest in KGD methods

KGD Carrier Technology

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But . . .

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- KGD still hasn't "taken off"
- Check 1997 NTRS
 - KGD not included
- Technology must continue to improve
 - Future devices will magnify the thermal, electrical, mechanical problems
 - Need to fully condition die at wafer level
- Burn-in confuses issue
 - How can it be known good if it hasn't seen burn-in?
- Business issues always problematic

Worldwide KGD

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- EDMTC committee of EIAJ
 - KGD surveys/roadmaps
 - Standards study group
- GOOD-DIE program in Europe
 - ESPRIT DG-III of the European Commission
 - Development of KGD database
 - Standards review/proposals
- SEMATCH/MCC consortium

EDMTC/EIAJ

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- MCM/KGD study group in EIAJ surveyed MCM/KGD activities in Japan
- Bare die applications have been started for MCMs in notebook PCs and PDAs
- Bare die test is still at a low level in current products in Japan
- Hi density substrate is key for flip-chip/MCM applications
- Interest in standardization of bare die assembly processes and reliability evaluation methods for build-up substrates

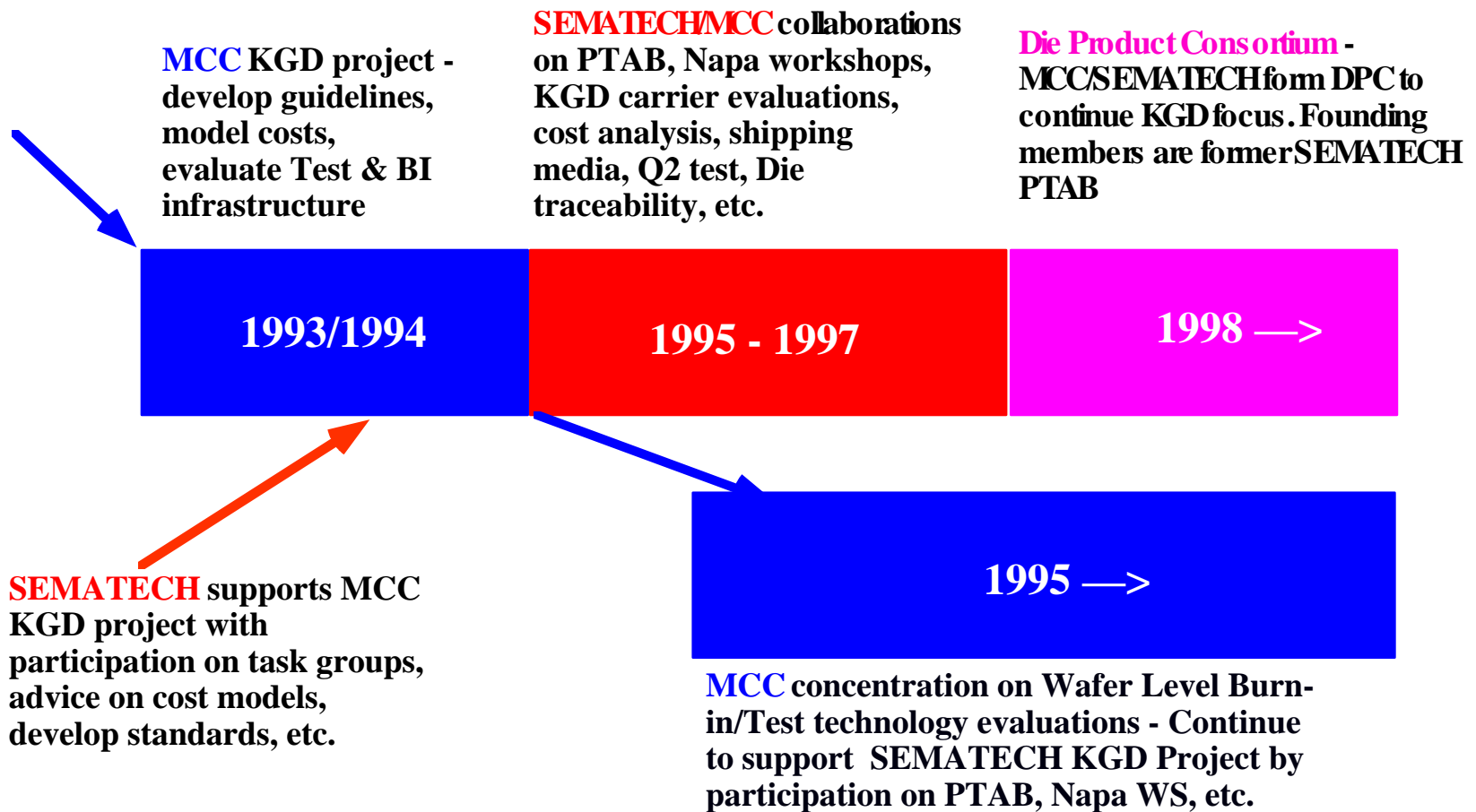
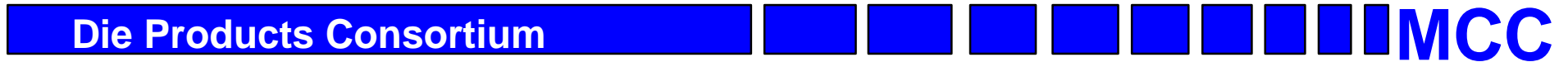
GOOD-DIE

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- Get Organised Our Dissemination of Die Information in Europe
- Partners
 - CODUS, Philips, IMEC, Rood, Eltec
 - Associates: GPS, Mietec, TEMIC, MHS, Siemens
- GOOD-DIE program ends now
 - GOOD-DIE II funded, detailed tasks being defined
 - » Exchange of KGD/CSP information throughout Europe with cross fertilization to the USA, Japan and the rest of the World
 - » Collaborate with the CECC on European standard for KGD.
 - » Assess the handling and delivery methods for KGD/CSP
 - » Assess testing and burn-in technologies for KGD/CSP

KGD Programs at SEMATECH & MCC



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- SEMATECH has subcontracted its KGD project to MCC
- 6 Members (all SEMATECH member companies)
 - National Semiconductor, Hewlett-Packard, Texas Instruments, Lucent, Rockwell, IBM
 - Intent is to add new members interested in promoting die market
- 1998 is transition year

DPC Mission

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■ Mission:

- Provide leadership to the IC industry for developing methods that promote improved die product (including flip chip) quality, reliability, handling, shipping, and associated infrastructure at lowest cost to meet the needs of users for smaller form factor, higher performance, lower cost products.

■ Objectives:

- Maintain Worldwide Leadership as Focal Point in Die Products Industry
- Drive Enhancement of Industry Standard Infrastructure
- Encourage Industry Adoption of Improved KGD Test, Quality & Reliability Methods

1998 tasks

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- Develop standard definition of KGD
- Identify/Baseline current standards applicable to KGD
- Compile/Publish die handling infrastructure/process status
- Propose shipping media standard to JEDEC
- Propose traceability standard to JEDEC
- Publish survey of bump die test methods
- Publish KGD metrics and methods by industry segment
- 3 Projects

DPC Projects

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- Host Annual KGD Workshop
- Develop Die Traceability Methods
 - Feasibility study complete
 - Multicompany qualification
 - Propose standards
- Develop KGD Test Methods
 - Test, reliability screens at wafer level

5th Annual KGD Workshop


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- September 23, 24 & 25;
Napa, CA
- 5 technical sessions, 19 presentations
- 21 exhibitors (a few spaces left)
 - Aehr
 - Bear
 - Chip Scale Robotics
 - Chip Supply
 - Die Technology
 - Eltek
 - Fluoroware
 - Gel-Pak
 - Good-Die (Codus)
 - Minco
 - National Semi
 - Royce
 - Semiconductor Equipment
 - Tempo
 - TI
 - Viking
 - 3M

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SEMATECH



**5th Annual
KGD Industry Workshop
September 23, 24, 25, 1998
Napa Valley, California**

*“Die Products Compete in Consumer
and Specialty Markets”*

General Chairs:
Sherb Bridges, National Semiconductor
Lo-Soun Su, IBM
Mont Taylor, Texas Instruments

Program Chair:
Larry Gilg, MCC

Sponsored By:
IMAPS, MCC and SEMATECH

KGD Test Methods

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■ 1996-1997 SEMATECH KGD PTAB

- 125°C/125µm probe capability
- Test methods
 - » Voltage Screens
 - » I_{DDq} Testing

■ 1998 Test Methods Workshop

- Overview of KGD test methods
- DOE details

■ Multicompany demonstration

- Demonstrate defect acceleration using voltage
- Determine if common failure mechanisms predominate
- Model screening effectiveness

Die Traceability

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- Two phase project
- Phase I - Feasibility of laser marking on Si
 - Results encouraging
 - Several suppliers involved
- Phase II - Reliability implications of laser marking
 - Several different IC manufacturers' products
 - Use best methods from Phase I
- Results form basis for standards proposal

Future Directions

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- Continued industry collaboration
 - MCC, Sematech, GOOD-DIE, EIAJ
- Develop KGD infrastructure
 - KGD Suppliers, Users, Equipment/Material suppliers
- Develop better test methods
 - Test coverage - problem for Si in general
 - Reliability screens at wafer level
- Develop KGD quality systems standards
 - Cleaning, visual inspection, testing, Reliability measures
- Develop and implement low cost Wafer-level KGD