

**Tutorial A3**  
**3:30pm-5: 30pm**

**Redundancy Requirements for Embedded Memories**

*Duration:* 2 hours, including Q&As

*Organizer:* Mo Tamjidi, Dolphin Technology

*Presenter 1:* Mo Tamjidi, Dolphin Technology

*Presenter 2:* Bejoy Oomman, Genesys Testware

Multi-megabit embedded random access memories are widely used in complex system on chip ICs. The manufacturing yield of these system ICs, and consequently their unit cost is mainly dependent on the yield of these embedded memories. The yield of large embedded memories can be easily increased using spare memory cells, which are substituted for faulty memory cells during the manufacturing test process. The three main approaches to memory substitution are using laser blown fuses, electrical fuses and dynamic repair. Laser fuse based repair is the most popular approach. However, this increases test costs substantially since a 3-step test process (test, laser repair, retest) is required. Electrical fuse based repair can be performed as a single process on the IC tester. However, electrical fuses are not supported in most processes. Dynamic repair uses Built-In Self-Test, Diagnosis and Repair Circuitry, which recalculates faulty locations and remaps them to spare locations on system power-up. This approach does not require any changes to the backend manufacturing process. However, process-voltage-temperature sensitive failures cannot be corrected since the power-up operating point is unpredictable.

**Tutorial Track B**

Chair: David Overhauser, Simplex Solutions

**Tutorial B1**  
**9:00am-12:00pm**

**Design Metrics to achieve Design Quality**

*Duration:* 3 hours, including a ½ hour break and Q&As

*Organizer:* Ronald E. Collett, Numetrics Management Systems

*Presenter 1:* Andrew Kahng, UCLA

*Presenter 2:* Ronald E. Collett, Numetrics Management Systems

*Presenter 3:* Ton. H. van de Kraats, Philips Semiconductor

This tutorial provides a framework that defines design quality and presents a suite of metrics that quantify design quality. The underlying rationale for the definitions of design quality and accompanying metrics is provided. Within the context of this tutorial, design quality encompasses both the quality of the design process and the quality of the underlying design created by the design team. The basic methodology and mathematical models supporting the definitions and metrics are explained. Results of actual use of these metrics in the industry are presented along with a list of the companies utilizing them. The tutorial will also provide insight on deployment strategies for a design quality metrics system. This will be complemented by an explanation of what benefits can be expected from such a system. Finally, the tutorial reviews recent academia-industry initiatives aimed at establishing an open infrastructure and standards for design process data collection.