

More Effective Automotive Design: Advancing Reliability Methodology

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Modern cars define their value and differentiation increasingly by their Software/Hardware functionalities that include a wide variety of electronic products ranging from sensors, actuators, engine controls, zonal preprocessing, central processing units to intelligent high voltage charging controls for electric vehicles. In addition to the functional and power-performance-area-cost (PPAC) requirements, automotive products need to satisfy stringent quality, reliability, and safety standard requirements. These requirements add new optimization dimensions to the technology selection and design process that product designers, silicon architects and design teams need to take into consideration early on.

This talk starts with an overview of the automotive supply chain and how GlobalFoundries handles automotive requirements from end-to-end from technology development, design enablement to production. The talk zooms into the aspects of an automotive design platform, especially on where reliability and functional safety plays a role in Process Design Kits (PDK), Foundational IP (FIP), and Design Flows.

The talk introduces the basic reliability fail and degradation mechanisms for the transistors, dielectric breakdown, and aging, as well as for the wiring, electro-migration (EM) and how these are modelled for use in a design flow.

Automotive application profiles describe the complex stress conditions that the silicon will experience during production test and field operation. An accurate understanding and modelling of these profiles is essential to avoid unnecessary margins for the IP and product design and consequently for achieving the PPAC requirements of the product.

The talk includes an illustrative case report that shows how a proper understanding and modelling of the application profile can considerably reduce the margining for aging degradation.

The Electronic Design Automation (EDA) industry has recognized reliability and functional safety as a key field of innovation in tools and flows especially for automotive designs. These novel SW tools and flows together with refined foundry models enable a reduction of pessimism and consequently better design metrics while still ensuring the stringent automotive requirements. The talk will introduce these advanced methodologies, their expected value proposition and how those can be incorporated in a design platform offered by a foundry.