

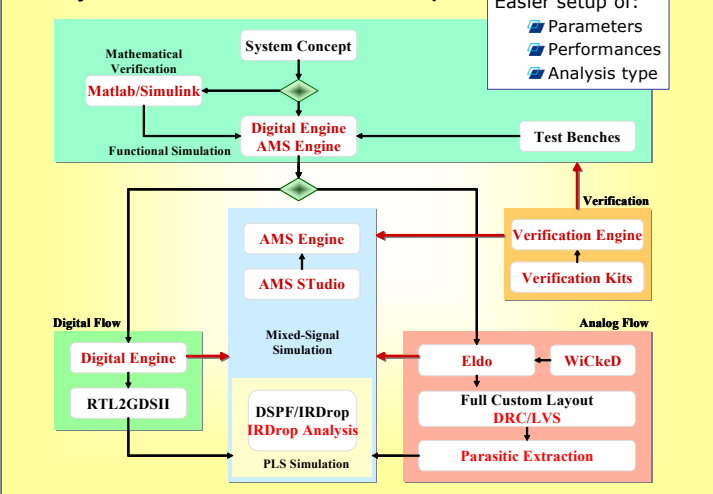
Designflow Architecture and Integration of Statistical Sizing Methods in STMicroelectronics Non-Volatile-Memory (NVM) and Automotive Flow based on MunEDA-WiCkeD and Mentor-Eldo

Key Topics in Deep Submicron

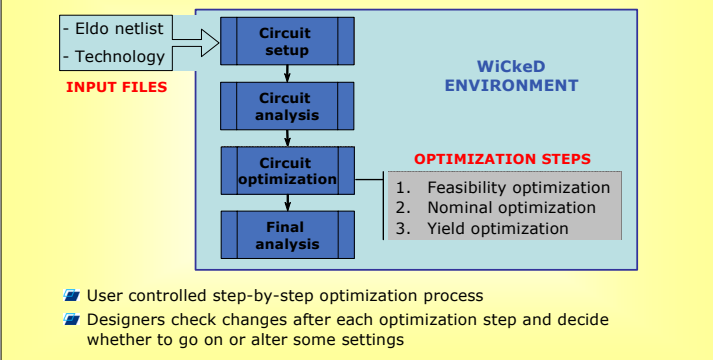


Several applications are moving from fully digital to mixed-signal domain integrating sensitive analog parts and often embedding flash memories. Full chip PLS with parasitic components and IR drop analysis are everyday more tricky whereas at the same time become strictly mandatory before going to fabrication. Very deep submicron technologies with wide process variations (variability) require nominal optimization and statistical design analysis processes both at cell level and block/IP level to enhance and optimize yield. A really robust and efficient AMS design flow including AMS verification is mandatory to go to fabrication with the minimum risk of failure. Usage of circuit/spice checks and Safe Operating Area (SOA) capabilities will dramatically increase and become sign-off for all design teams.

AMS Full Design Flow for STMicroelectronics NVM Non-Volatile Memory & APG Automotive Products Group

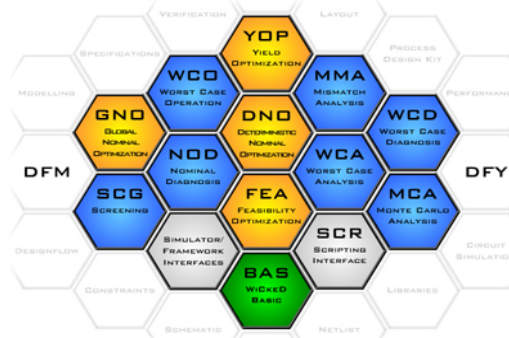


WiCkeD Design & Optimization Flow with STMicroelectronics based on Mentor Graphics Eldo Circuit Simulator



MunEDA DFM-DfY Tool Family WiCkeD

MunEDA offers numerous tools for circuit analysis, diagnosis and circuit optimization as well as interfaces to industrial standard and inhouse design environments and simulators.



Mentor Graphics Eldo® Circuit Simulator

The Mentor Eldo® simulator is the simulator of choice for IC silicon vendors and Fabless design centers for four reasons: speed, accuracy, convergence, and capacity.

When compared to other commercial or internal SPICE simulators, users report a 3X to 10X speed ratio without experiencing a compromise of accuracy, compared to silicon. Eldo provides the best-in-class convergence for all problems. Designers worldwide use Eldo on designs ranging from the lowest complexity of a single cell to systems of up to 300,000 transistors or more. The Eldo analog IC and system simulator speeds the design and verification of complex A/MS circuits, whether used as a point tool or within a Mentor Graphics or Cadence framework.

STMicroelectronics Circuit Reference Example: Performance & Yield Analysis and Optimization of Sense Amplifier for Flash Memory (90nm)*

Results from the initial WiCkeD Monte Carlo Analysis:

- 3000 samples for each performance
- Total initial yield = ~3%

After WiCkeD Feasibility and Nominal Optimization: 70% Yield

Specifications	Iterations	Phase Margin	V_diff	Yield
phase_margin	52.96	56.87	45	70%
v_diff	102.4 m	240.74 m	100 m	70%

After WiCkeD Yield Optimization: 100% Yield

Specifications	Iterations	Phase Margin	V_diff	Yield
phase_margin (lower)	62.962	45	5.429	100.000
v_diff (lower)	326.7 m	100 m	6.643	100.000

*) Results published at MUGM2007



Pierluigi Daglio, NVM AMS Flows & Methods Manager, STMicroelectronics:

"WiCkeD is a perfect tool for circuit analysis, design optimization and yield enhancement. STMicroelectronics has used WiCkeD based on Mentor Eldo circuit simulation in numerous benchmarks and real applications and proved it helps to design more robust circuits with a better yield."



About Mentor Graphics

Mentor Graphics® is a technology leader in electronic design automation (EDA), providing software and hardware design solutions that enable companies to develop better electronic products faster and more cost-effectively. The company offers innovative products and solutions that help engineers overcome the design challenges they face in the increasingly complex worlds of board and chip design. Mentor Graphics has the broadest industry portfolio of best-in-class products and is the only EDA company with an embedded software solution.

For further information visit www.mentor.com.

About STMicroelectronics

STMicroelectronics is according to the latest industry data the world's fifth largest semiconductor company with market leadership in many fields. The company's sales are well balanced between the semiconductor industry's five major high-growth sectors: Communications, Consumer, Computer, Automotive and Industrial. ST is the leading producer of application-specific analog chips and power conversion devices. It is also the #1 supplier of semiconductors for the Industrial market and for set-top box applications, and occupies leading positions in fields as varied as discrete devices, camera modules for mobile phones and automotive integrated circuits.

For further information visit at www.st.com.

About MunEDA

MunEDA provides leading EDA technology for analysis and optimization of performance and yield of analog, mixed-signal and digital designs. MunEDA's products and consulting enable customers to reduce the design times of their circuits and to maximize robustness and yield. MunEDA's solutions are in industrial use by leading semiconductor companies in the areas of communication, computer, memories, automotive, and consumer electronics.

For further information visit www.muneda.com.