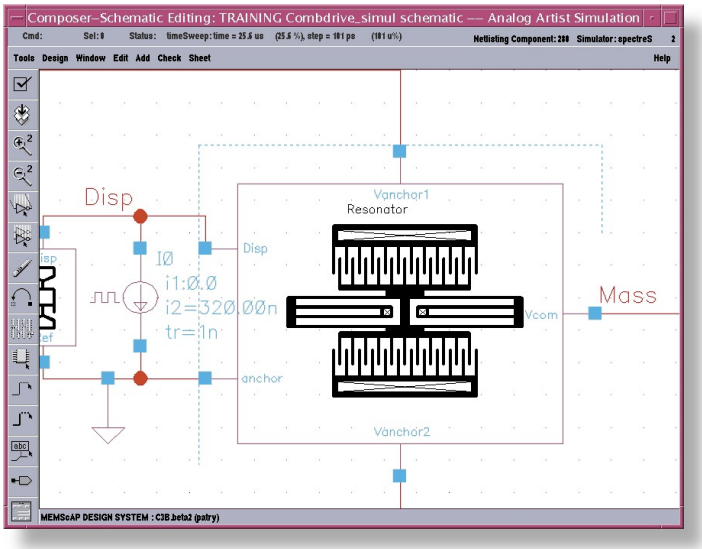
MEMS *Xplorer v4.0*

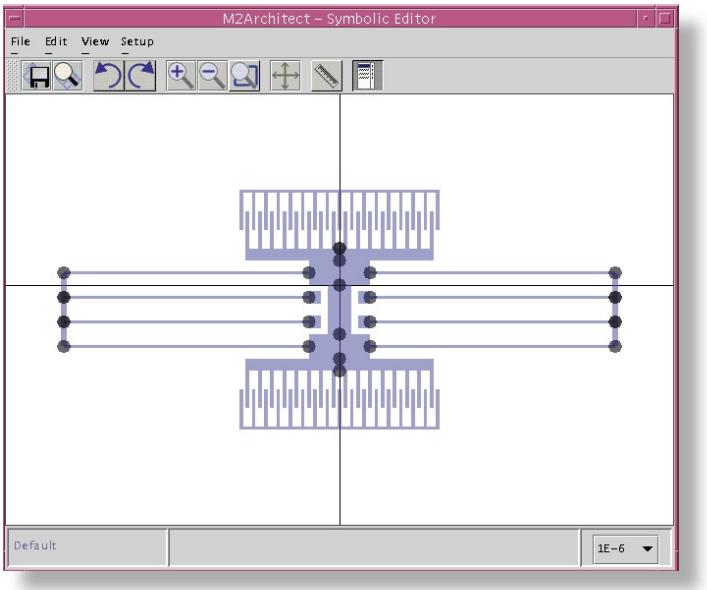
MEMS Xplorer combined with the Cadence Custom IC Tool suite creates a very powerful and robust solution for both MEMS and IC design. The **MEMS Xplorer** modules are completely integrated in the Cadence environment making it very easy to learn and to use. Functionalities include mixed MEMS/IC schematic capture and simulation, full custom mask layout capability and verification, 3D model generation and visualization, behavioral model creation and links to 3D analysis packages.

Features

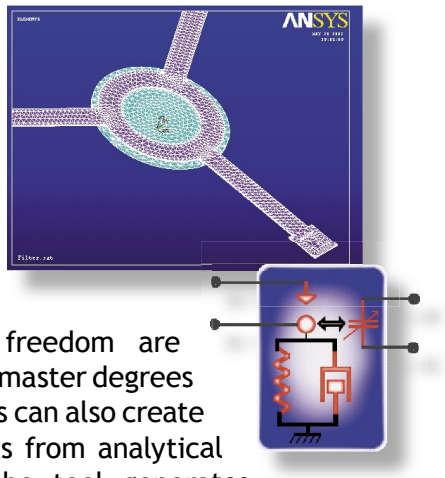
System-level Tools: MEMS Xplorer combined with Cadence provides system-level design capability through fully hierarchical schematic capture and behavioral level simulation of MEMS devices with electronics and packaging. MEMS devices are represented with multi-physics signals in mechanical, thermal, magnetic, fluidic, optical, and electro-static domains in Verilog-A. The **MEMS Verilog-A** library contains models for popular MEMS devices. Simulation modes include AC, DC operating point, DC transfer sweep, Fourier, Noise, Transient, Transfer function, and Parametric Sweep.



MEMS Master is a position dependant schematic tool for rapidly creating hierarchical MEMS models from primitive devices. Models from MEMS Master can then be simulated in the Cadence analog/mixed signal simulator environment ensuring the link with system designers.



Modeling: MEMS Modeler automatically generates coupled electro-static-mechanical- thermal behavioral models ready for system simulation with electronics and packaging from 3D data from analysis packages. Complex, finite element models involving a large number of degrees of freedom are reduced to a few master degrees of freedom. Users can also create their own models from analytical equations and the tool generates simulation-ready descriptions in Verilog-A.



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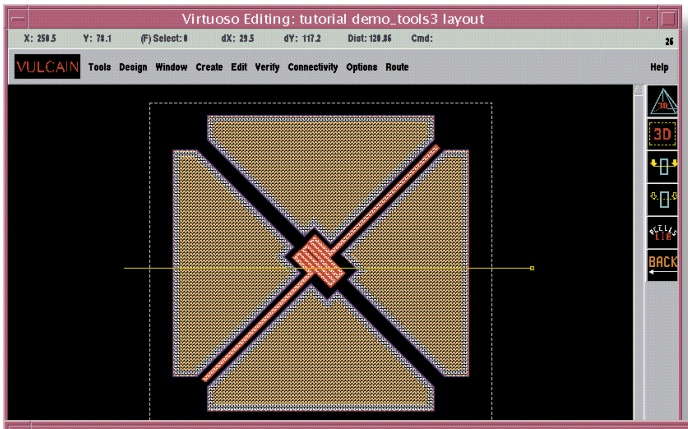
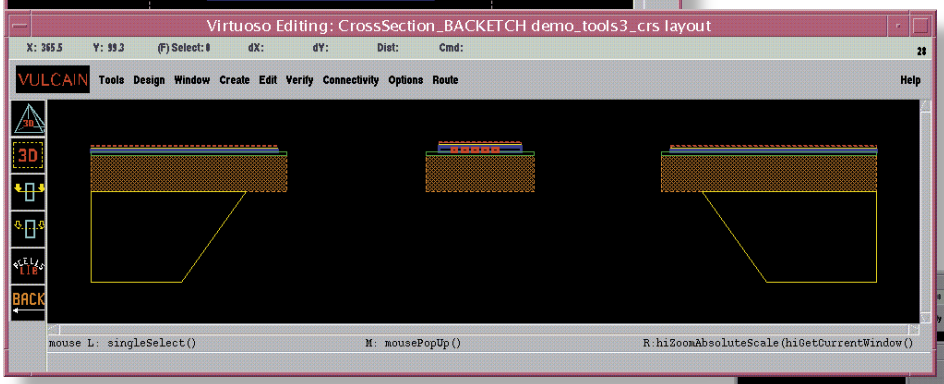
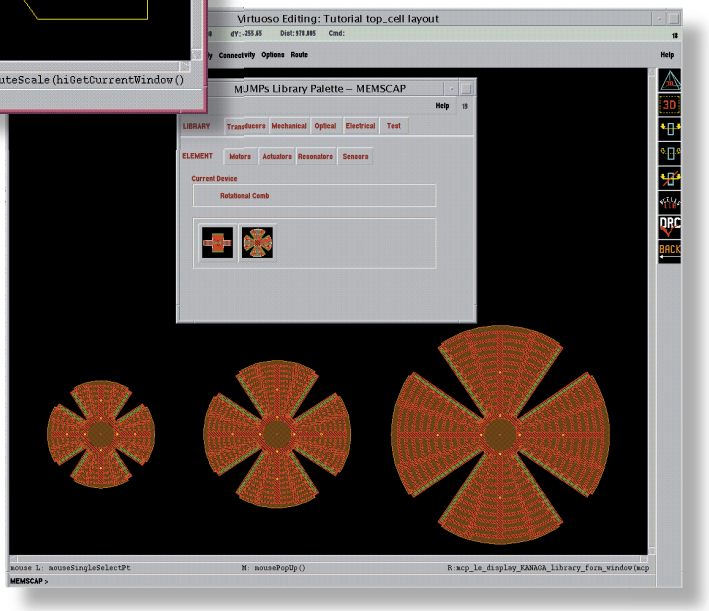




The **Cross Section** Viewer displays a cutaway view in the z-dimension based on a user-specified cut line in a Virtuoso window. The **3D Solid Modeler** creates a 3D view of a MEMS device from the device layout. Surface and bulk micromachining process steps such as material deposit, etch, mechanical polish, diffusion, growth, electroplating and wafer manipulation steps are supported. The 3D model may be scaled and a subset of mask layers may be selected for view. As MEMS are inherently 3D structures use of these tools is important to understand the resulting fabricated device structure in 3D dimensions. **3D-To-Layout** converts 3D solid models into 2D mask layouts using fabrication process information enabling capture of device modifications made in analysis tools.



Layout Editing: MEMS Xplorer enhances Virtuoso capabilities for MEMS mask design. **Easy MEMS** offers automatic generation of curved shapes such as torii, splines, fillets, and general equation-based curves. **MEMS Device Generators** speed up the development of complex mask geometries by enabling designers to create process-compatible, parameterized, often-used blocks that may be combined to construct larger designs. A library of often used MEMS structures included. The **Easy MEMS** tool helps to automate tasks that are time-consuming for creating MEMS mask layout such as creating polar arrays and useful macros include the generation of holes and dimples to properly release MEMS structures. The **MEMS Etching Emulator** allows a 2D analysis of how the design will appear after anisotropic bulk etching.

MEMS Xplorer has an intuitive user interface and provides MEMS-specific capabilities that greatly reduce mask layout time. Popular output formats are supported so mask designs are "foundry ready". **MEMS Verification** provides a configurable design rule checker that verifies MEMS layout against fabrication requirements to prevent costly design errors causing extra fabrication runs and ensures manufacturability.

Foundry modules enable targeting of specific process technologies and provide process-specific device intellectual property. A variety of foundry-specific modules are fully integrated with SoftMEMS' tool suites to ensure process compatibility and manufacturability with the world's leading MEMS foundries. Foundry modules include design rules, mask descriptions, device descriptions for extraction, process parameters and material properties, and fabrication process descriptions. The **MEMS Xplorer Technology Manager** facilitates easy configuration and communication of technology information such as material properties and process descriptions among the different simulation tools.

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