Expert Layout Editor Recent Improvements – Over-the-Point Drawing of Orthogonal Shapes

This article presents an overview of new features added to Silvaco's *Expert* layout editor. Silvaco has taken a careful look at the real-world obstacles faced daily by semiconductor layout designers and design engineers. Silvaco has augmented *Expert* with features that dramatically increase flexibility and also help to reduce constraint violations and other roadblocks inherent to complex layout design.

Expert is a fast, robust, PC-based editor that is designed to manage the complex issues inherent to advanced, deep-submicron Ultra Large Signal Integration (ULSI) designs. *Expert's* proprietary database efficiently processes (ULSI) without restrictions on layout complexity or type of geometry. These improvements once again secure *Expert's* place as an industry standard without sacrificing the stability and ease-of-use that seasoned layout experts have come to expect and rely on.

New Features, Better Results

Expert's new features help users avoid the geometrical constraint violations that result from non-orthogonal cursor movements during the creation of polygon and 90-degree Angle Mode wires. *Expert* now defines authorized cursor movements with specific axis points. The software automatically adds extra vertices in order to keep shapes consistent within the allotted space. Seasoned users of *Expert* have more flexibility than in previous versions that automatically restrained the cursor to orthogonal movements while in Direction Snap Mode.

The orthogonal-movements-only option is still available in the Edit > Direction Snap Mode > Orthogonal menu. In this mode, each defined vertex requires a single mouse click.

New menus simplify and augment project setup. Angle Mode easily sets default geometrical constraints for 90- and 45-degree custom layouts. Direction Snap Mode restricts potentially dangerous cursor movement to user-defined behavior patterns during object creation and modification. These features are accessed from either Edit > Angle Mode or Edit > Direction Snap Mode menus, by clicking the corresponding Drawing Bar, or by pressing an assigned hotkey.

Over-the-Point Mode simplifies the shape definition process and then quickly renders orthogonal polygons and wires. When this mode is active, a user-specified definition is needed for every second vertex (1st, 3rd, 5th, etc). Two consecutive orthogonal polygons or wires are created with a single mouse click in projects where Angle Mode is set to 90 degrees and Direction Snap Mode is set to "None" (no cursor movement) or to "Diagonal" (diagonal and orthogonal movements only).

The Vertical First option simplifies the drawing of complex shapes with Over-the-Point input. If the Edit > Region Mode > Vertical First option is checked, the first segment is created vertically and the second one, horizontally. If the option is not checked, the reverse is true. The Vertical First shortcut enables or disables this feature during object drawing.
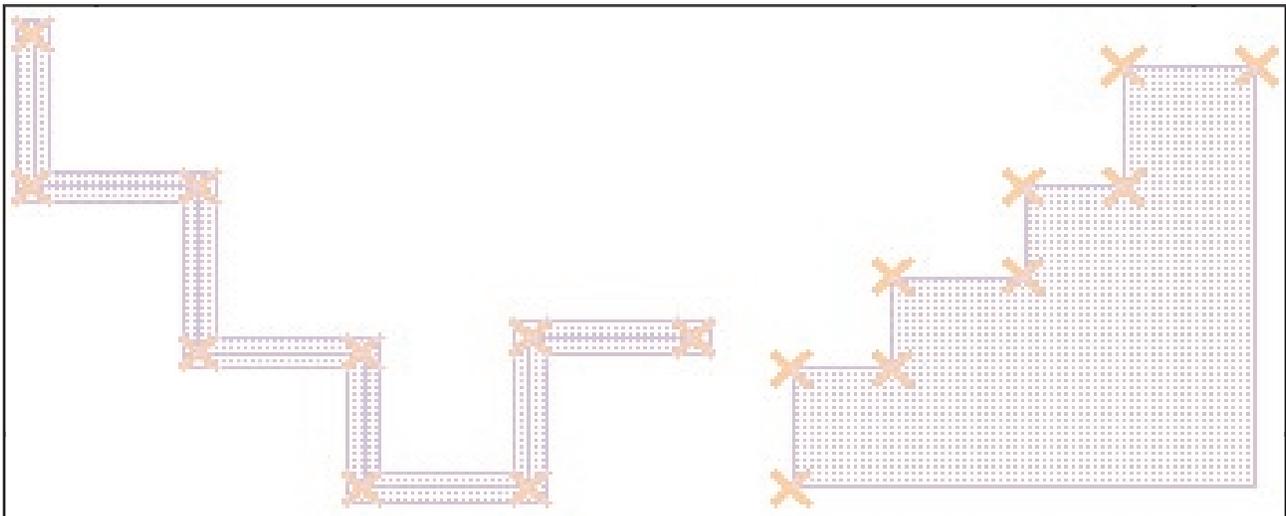

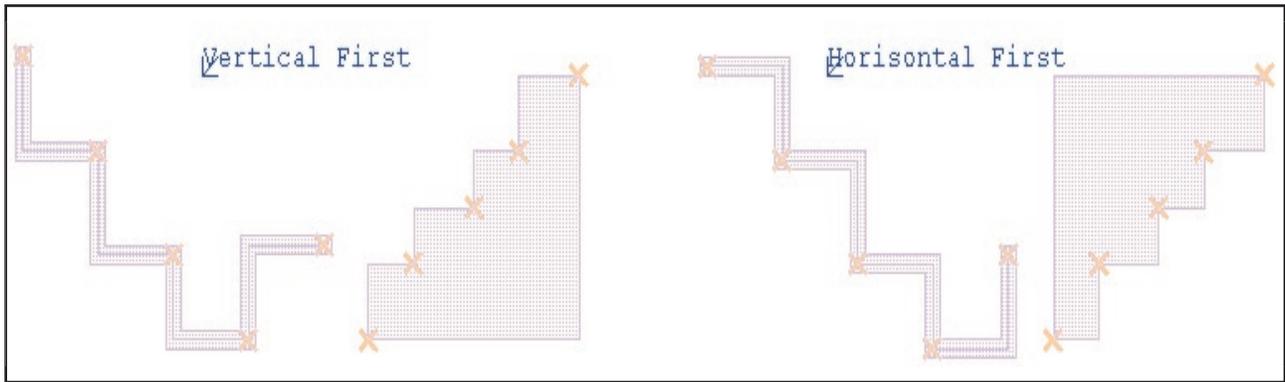Figure 1. Orthogonal cursor movements only.

Figure 2. No restriction on cursor movements.

Search and Properties Dialogs
No Longer Block Editing

The Edit >Search and Edit >Properties dialog boxes are reimplemented as non-modal, i.e., *Expert* window is available for editing, while search results are available for traversing. This allows to make search only once to perform any legal operation with each found layout object.

Show Critical Zone Option in *DRC Guard*

DRC Guard checks geometrical design rules during construction, in other words "on the fly". Rules for checking are specified by an ordinary DRC script. The violations are not saved in the DRC error database, but are reported by blinking markers on the screen. If the cursor is placed at a blinking error marker, a short description of the error appears as a small pop-up label. To fix indicated DRC rules violation, objects with violating segments should be modified or moved to make blinking marker disappear.

Expert DRC Guard's Show Critical Zone option displays or hides critical zone indicators in the design layout. The critical zone clearly highlights the minimal shifts of violating segments that are critical when troubleshooting potentially detrimental DRC violations. The option is available only when the Show Error Flags menu option is enabled.

Conclusion

This paper provides a brief sketch of some of the new features in Silvaco's *Expert* layout editor. These features simplify the layout design process and enhance the flexibility that *Expert's* satisfied users are familiar. Additional information about these and other features is found in the Expert product documentation or from Silvaco International.
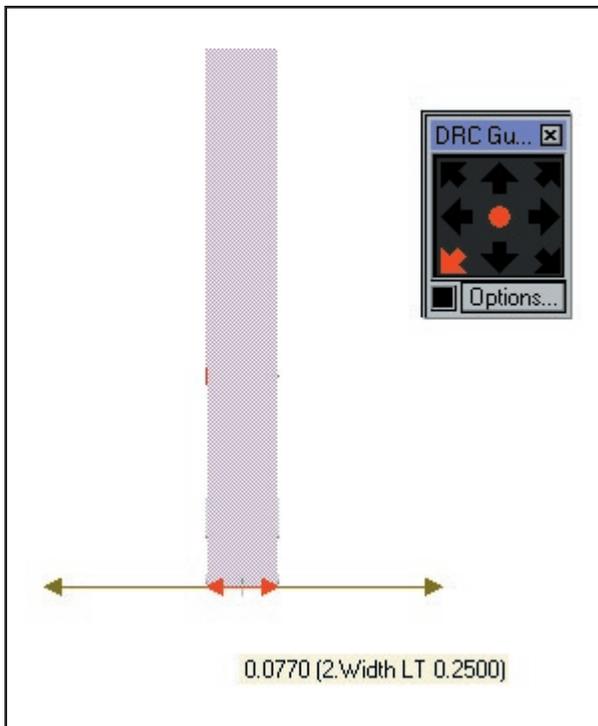

Figure 3. Arrows at both sides of the object show critical zone for width error.