Expedition Advanced Technology Pro

- EE2007.5 release brings Advanced Technology Pro into the MCM/Hybrid and Package Design domain

- Focus on 3D aware data model
  - Real Correct by Design vs. “emulation & workarounds”
    - 3D wirebonds
    - 3D cavities with automatic part and bondpad drop down
    - 3D die stacking

- Focus on Real time 3D DRC
  - Unlike competition: catch 3D issues before they are made
3D Bond Wire and Connectivity

- **3D Bond Wire Object**
  - New intelligent connectivity model using a dedicated wire object to form connection between die pins and bondpads
  - Schematic and Cell neutral - Use alternate cell to quickly switch between bare die and packaged parts

- **Real time 3D DRC based on real nets**
3D Wire Model

- **Flexible 3D Wire Model**
  - Created in Expedition using control points
  - 3D representation as you create or modify the model
  - Ball-Wedge & Wedge-Wedge wire profiles

- **3D Interactive bond loop editing**
  - Global or Instance of wire
  - Drag’n drop adds ease of use
  - Parametric variable expressions
  - Real time3-Plane with 3D view

- **Wire model supports**
  - Corner
  - Arc
  - Splines
  …to Allow accurate representation of wires

- **3D DRC of instance modified wires**

- **Top view of wire in design area**
3D Wire Model

- Flexible 3D Wire Model
  - Created in Expedition using control points
  - 3D representation as you create or modify
  - Ball-Wedge & Wedge-Wedge wire profiles

- 3D Interactive bond loop editing
  - Global or Instance of wire
  - Drag’n drop adds ease of use
  - Parametric variable expressions
  - Real time 3-Plane with 3D view

- Wire model supports
  - Corner
  - Arc
  - Splines
3D Wire Bonding

- Automation bond pattern generation
  - Arc, Straight, Follow Shape and Equal Length patterns allow large numbers of wire bonds to be added automatically
  - Supports Die-to-Die connections

- Interactive bond pattern creation and movement allows that extra tweak for complex connections
  - Chip to Board, Die-to-Die and Re-Connect to existing bondpads
  - Rotate bondpads in motion to optimize space usage

- Real time 3D DRC during placement and manipulation
3D Wire Bonding

- Automation bond pattern generation
  - Arc, Straight, Follow Shape and Equal Length patterns allow large numbers of wire bonds to be added automatically
  - Supports Die-to-Die connections

- Interactive bond pattern creation and movements allows that extra tweak for complex connections
  - Chip to Board, Die-to-Die and Re-Connect to existing bondpads
  - Rotate bondpads in motion to optimize space usage

- Real time 3D DRC during placement and manipulation
Die Stacking

- Vertical stacking of parts
  - Interactive 3D stack editor
- Bare Die and Interposer support
- Advanced die to die bonding of stacks
  - Die to die
  - Die to die substrate
  - Reverse wire bonds
- 3D real time DRC
  - Bond wire to die edge and surface
Die Stacking

- Vertical stacking of parts
  - Interactive 3D stack editor
- Bare Die and Interposer support
- Advanced die to die bonding of stacks
  - Die to die
  - Die to die substrate
  - Reverse wire bonds
- 3D real time DRC
  - Bond wire to die edge and surface
3D Wire Bond Rules

- Wire bond design rules
  - Defined using hierarchy
    - Design
    - Group (Requires RF license)
    - Component
    - Pin
  - Maximum allowed angle
  - Minimum and Maximum wire length
  - Wire to
    - Wire
    - Cavity
    - Die Edge and Surface
    - Metal
  - Real time 3D DRC to ensure design is correct by construction
Cavities

- Single design object to create cavities
  - Open or Sealed
  - Span multiple layers

- Combine cavity objects to create Staircase cavities

- Easy to create, edit and move using traditional draw operations

- Automatic Placement in Cavity
  - Parts and bondpads automatically ‘drops’ into the cavity eliminating manual part and pad stack mapping
  - Supports regular and wire bonded parts

- 3D DRC-Bond wire checked against cavity Walls using real time DRC to ensure design is correct by construction

- Parts allowed to partially overlap or bridge cavity
  - Including mechanical parts like shield boxes
Cavities

- Single design object to create cavities
  - Open or Sealed
  - Span multiple layers

- Combine cavity objects to create
  Staircase cavities

- Easy to create, edit and move using traditional draw operations

- Automatic Placement in Cavity
  - Parts and bond pads automatically ‘drops’ into the cavity eliminating manual part and pad stack mapping
  - Supports regular and wire bonded parts

- 3D DRC-Bond wire checked against cavity
  Walls using real time DRC to ensure design is correct by construction

- Parts allowed to partially overlap or bridge cavity
  - Including mechanical parts like shield boxes
Cavities

- The single cavity object is recognized as a 3d object
  - Interactive and auto-router respects the cavity boundary on all affected layers
  - Auto-router correctly escapes or avoids the cavity boundary
  - Fanout of pads within the cavity will be done with correct via span by looking at the layer span of the cavity object

- Control if plane or all metal is allowed inside the cavity boundary or not

- Cavity Design rules
  - Inside Edge to Parts
  - Outside Edge to non-Plane Conductor
  - Outside Edge to Plane Conductor
  - Cavity Edge to Cavity Edge
Is that all?

- Flexible solution to support more exotic use cases
  - RF Couplers with wires
  - Suspended RF traces
  - Wirebonds between regular parts
  - Parts ‘hanging’ in the cavity roof
  - Parts embedded in layer stackup