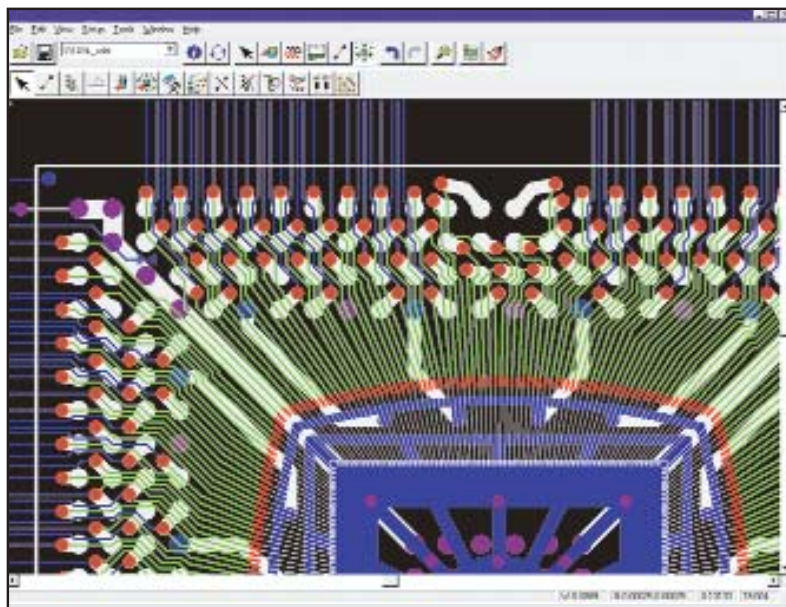


# Chip on Board and Advanced Packaging Toolkit

PCB Layout

D A T A S H E E T



*The COB Toolkit and Advanced Packaging Toolkit reduces design time for PADS®-Layout customers who design with bare-die components*

## Overview

The Chip on Board (COB) Toolkit and Advanced Packaging Toolkit can significantly reduce package design time for PADS® Layout users who work with bare-die components such as single- and few-chip modules and chip-on-board.

Both the COB Toolkit and Advanced Packaging Toolkit improve design quality by automating many aspects of the advanced package design process, including die capture, rules-based wire bond design, flip-chip definition, and report generation. The Advanced Packaging Toolkit additionally aids in the routing of single chip packages and the definition of die flags. A variety of die, die flag, and route wizards and tools speed design reuse and the generation of manufacturing data.

The robust features found in the COB Toolkit and Advanced Packaging Toolkit simplify and support the design of ball grid arrays (BGAs), chip-scale packages (CSPs), multi-chip modules packages (MCM) and COBs.

## Major product features

- Cuts design time of substrates with bare-die components
  - Chip-on-Board (COB)
  - Single-chip packages
  - Few- and multi-chip packages
- Automates die creation
- Automatically creates die flags and power rings
- Uses rules-driven placement to automate wire-bond fanout
- Eliminates the complexity and tedium of routing large packages
- Wizards simplify design process
  - Die, die flag, and wire-bond wizards
- Imports GDSII/ASCII/DXF files

## The Die Wizard

Included with the COB Toolkit and Advanced Packaging Toolkit is a Die Wizard that enables construction of die part models from the die description data contained in GDSII or ASCII files.

Direct import of native GDSII/ASCII die files streamlines the design process, simplifies data transfer, and eliminates translation errors. If the GDSII file contains data beyond just the die description, you can use the wizard's dynamic preview capability and data-browsing and filter controls to extract die-specific data easily.

Die parts can also be constructed using data imported from an ASCII text file. The die wizard reads chip-bond pad information such as pad number, location, function, and pad shape and size from a comma-delimited text file.

Parameters contained in the wizard's construction templates make it easy to augment and modify data. Corresponding parameters are grouped together and presented in a multi-tab format to give you control over die size, origin offset, pad shape, pad size, pin sequence, and pin function names.

When GDSII/ASCII data are unavailable for import, you can use the die wizard to craft a die part. Parametric construction is ideal when early package exploration is necessary, such as when the die description is still in flux and exact information is unavailable.

**Supplement Missing Data** – After importing GDSII/ASCII data into the die wizard, parameters in the construction templates can be used to add missing data or to override imported data like die size or pad shape.

**Parametric Construction** – The die wizard interactively defines die parts using the parameters in the construction templates.

**Dynamic Preview Capability** – All construction options include dynamic data previewing for immediate graphical feedback during construction.

## The Die Flag Wizard

The Die Flag Wizard automatically creates die flags, rings, and their associated soldermask openings. By including soldermask creation, the die flag wizard consolidates design steps and simplifies design creation. Immediate graphical feedback is provided as parameters are entered and modified.

**Die Flag Construction** – With the die flag wizard, you can simplify die-flag construction and reduce design time by specifying the overall die-flag size relative to the selected die. Choose from predefined outer shapes (rectangle, rounded rectangle, or chamfered rectangle), specify net association, define the number of spokes and orientation, specify paddle coverage, and separate control ring and spoke width during parametric construction.

**Automatic Mitering** – Acute angles are mitered automatically during die-flag creation to prevent acid traps and improve manufacturability.

**Power Ring Construction** – Create an unlimited number of concentric power rings for an individual die. Specify ring width and clearance, select from predefined ring shapes (rectangle, rounded rectangle, or chamfered rectangle), or specify an arced ring. This functionality simplifies power ring construction and reduces design time. You can define and control soldermask openings when constructing die flags and power rings. Specify separate inside/outside compensation values to control soldermask over/undersize. To define the soldermask openings, simply

select a die part in the layout editor and use the dialog window. Once you are satisfied, the die flag and rings are constructed automatically on their assigned layers using design copper shapes. Standard editing functions allow shape modification.

**Unique Configurations** – The die flag wizard is designed to meet most standard design requirements. For designs requiring unique die-flag and ring configurations, a DXF import option is available.

## The Wire Bond Wizard

The Wire Bond Wizard provides rules-driven automatic wire-bond fanout capability that enables easy evaluations of routability and substrate bond pad placement trade-offs.

The wizard's easy-to-use dialog box provides one-stop definition for all the constraints and parameters necessary for automatic generation of wire-bond fanout patterns. Parameters and constraints are presented in logical groups for simplified setup and iterative exploration.

The wire bond wizard also supports symmetrical and asymmetrical wire-bond fanouts enabling mixed strategies on the same die. The wire-bond fanout algorithm always attempts to place substrate bond pads in compliance with the specified assembly rules. In the event of insufficient area, substrate bond pads are placed and violations reported enabling you to experiment with different strategies and visualize their results.

**Rules-driven Construction** – The wire bond wizard automatically generates substrate bond pad placements that comply with wire-bond assembly rules such as wire bond to wire bond, wire bond to substrate bond pad, substrate bond pad to substrate bond pad, minimum and maximum

wire length, and maximum wire bond angle.

**Guide Based Construction and Editing** – You can select predefined ring shapes (rectangle, rounded rectangle, chamfered rectangle, tent, or arced) as construction guides to ensure uniform substrate bond pad placement. During interactive editing, substrate bond pads automatically snap to guides, thus ensuring uniform pad placement.

**Multiple Ring** – The wire bond wizard supports multi-row and multi-tier wire bond fanouts with unlimited wire-bond guides.

**Dynamic Preview Capability** – You receive immediate visual feedback as rings are defined and nets assigned.

**Save and Reuse Parameters** – You can minimize setup time by saving ring definitions and parameters for reuse in other designs.

### The Route Wizard

As die I/O and package pin counts increase, so too does the complexity and tedium of routing large packages. The Advanced Packaging Toolkit's easy-to-use Route Wizard eliminates these problems by combining any-angle routing with pattern recognition to automatically route single-die advanced packages.

By optimizing connections based on the configurations of the grid-array fanout and plating tail, the route wizard can eliminate manual routing between a die and the package pins. The wizard can also reduce design time by providing interactive autorouting of die quadrants and sides for use in packages with multiple dies.

**Automatic Generation of Package Connections** – The route wizard automatically synthesizes connections between a bare die and a specific package layout. It supports any mix of user definitions, thus enabling collaboration between the packaging

engineer, the IC engineer, and the board designer to achieve optimized package pin definitions.

**Automatic Substrate and Array Pad Fanout** – Area array pads, the landing for solder balls on a package, are efficiently fanned out in regular patterns to conserve space, ease routing congestion, and support manufacturability.

**Automated Any-angle BGA Package Routing** – Because traditional autorouters are not optimized to handle substrate bond pads' any-angle rotation, they often require special methodologies to escape the die and weave through the array pattern to the destination pad. The Advanced Packaging Toolkit's route wizard, together with PADS® Router, our interactive route editor, can automate this task. Together, they offer automatic routing functions that complete any-angle interconnects for wire-bonded dies within BGA/CSP packages. By following your methodology, the Advanced Packaging Toolkit provides high completion rates while minimizing design time and effort.

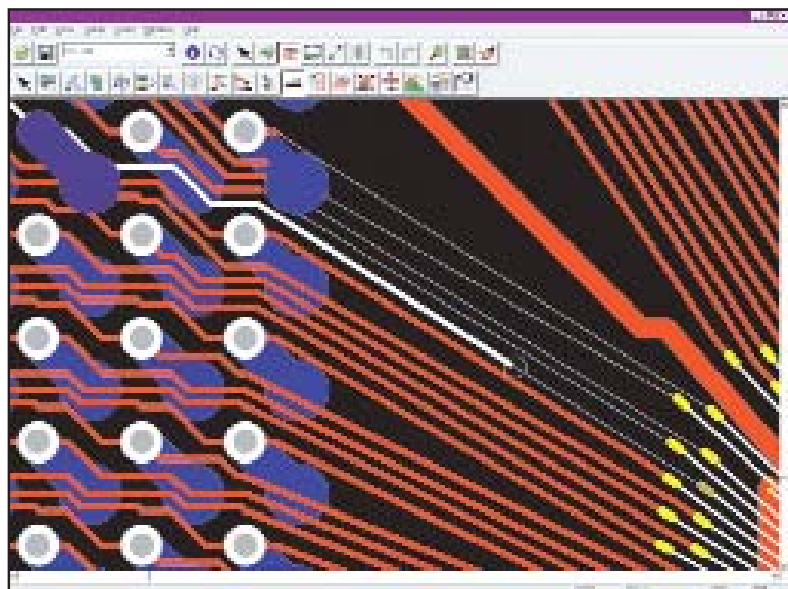
### Automated Plating Tail

**Generation** - Packages that require electroplating during fabrication must have each connection routed to an external plating bar. As package density increases, the plating tails require a design effort equal to the base interconnect. If plating tails are not included during initial feasibility evaluation, you may select an incorrect package, resulting in product delays. The route wizard optimizes the package interconnects by automatically routing plating-tail interconnects from the package feature closest to the edge of the package.

### Package Feasibility Evaluation

– As package pin-counts and design volume increase, packaging engineers must evaluate design feasibility and commit to a package almost immediately. Unfortunately, traditional feasibility test methods can lead to incorrect package choices, forcing a redesign late in the project, often resulting in a loss of business.

The route wizard enables you to determine package feasibility quickly, based on the die and a set of



*PADS Router, our interactive route editor, supports any-angle routing to substrate pads, with or without a netlist*

technology rules. Once feasibility is established, automatic routing completes and optimizes the design for manufacturing needs. This saves time in planning and manually routing. It also reduces design times significantly through interactive autorouting of die quadrants and sides for use in packages with multiple die.

### Report Generation

Once your package design is complete, you need to create technical documentation. This can be extremely tedious and error prone, as information must be correlated from multiple sources. The COB Toolkit and Advanced Packaging Toolkit automates this last step in the design process by automatically generating table-formatted documentation that:

- Automatically assigns the ball alphanumeric reference at its corresponding substrate bond finger
- Automatically generates technical definitions based on intelligent design and library data
- Creates intelligent connectivity data between the die, wire bonds, substrate route, and package output pins

### Summary

The COB Toolkit and Advanced Packaging Toolkit automates all aspects of the advanced package design process. From feasibility studies through final report generation, the COB Toolkit and Advanced Packaging Toolkit will give any PADS-Layout designer who works with bare-die components higher completion rates and reduced design times.

|                          | <i>COB Toolkit</i> | <i>Advanced Packaging Toolkit</i> |
|--------------------------|--------------------|-----------------------------------|
| <b>Die Wizard</b>        | X                  | X                                 |
| <b>Wire Bond Wizard</b>  | X                  | X                                 |
| <b>Report Generation</b> | X                  | X                                 |
| <b>Die Flag Wizard</b>   |                    | X                                 |
| <b>Route Wizard</b>      |                    | X                                 |

*The COB Toolkit and Advanced Packaging Toolkit offer scalable functionality to address your bare die design needs*

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