

“Helping our clients reduce expenses, while providing high-quality solutions, is key to our mutual success. One of our fundamental success factors at ACDi is “be self-motivated to complete tasks accurately and quickly. Our customers and co-workers depend on it.”

**Bill Hornbaker,**  
President and CEO  
ACDi

## COST-SAVING DESIGN SOLUTIONS FOR FINE-PITCH BGA

ACDi's engineering services team regularly works with our clients to produce reliable PCB designs with the lowest fabrication costs. A recent design highlights ACDi's expertise in the routing of fine-pitch BGAs, and the extra effort to reduce a client's board costs by up to 20%.

### PROBLEM

Our client came to ACDi for a re-design of a board we had previously laid out. The changes to the board involved adding a .5mm pitch Toshiba flash card. The existing stack-up was a 16-layer board with all thru vias. DFM constraints do not allow for thru vias small enough to fit inside the pad array of this fine-pitch part. Alternative fan-out methods would need to be used.

### SOLUTIONS

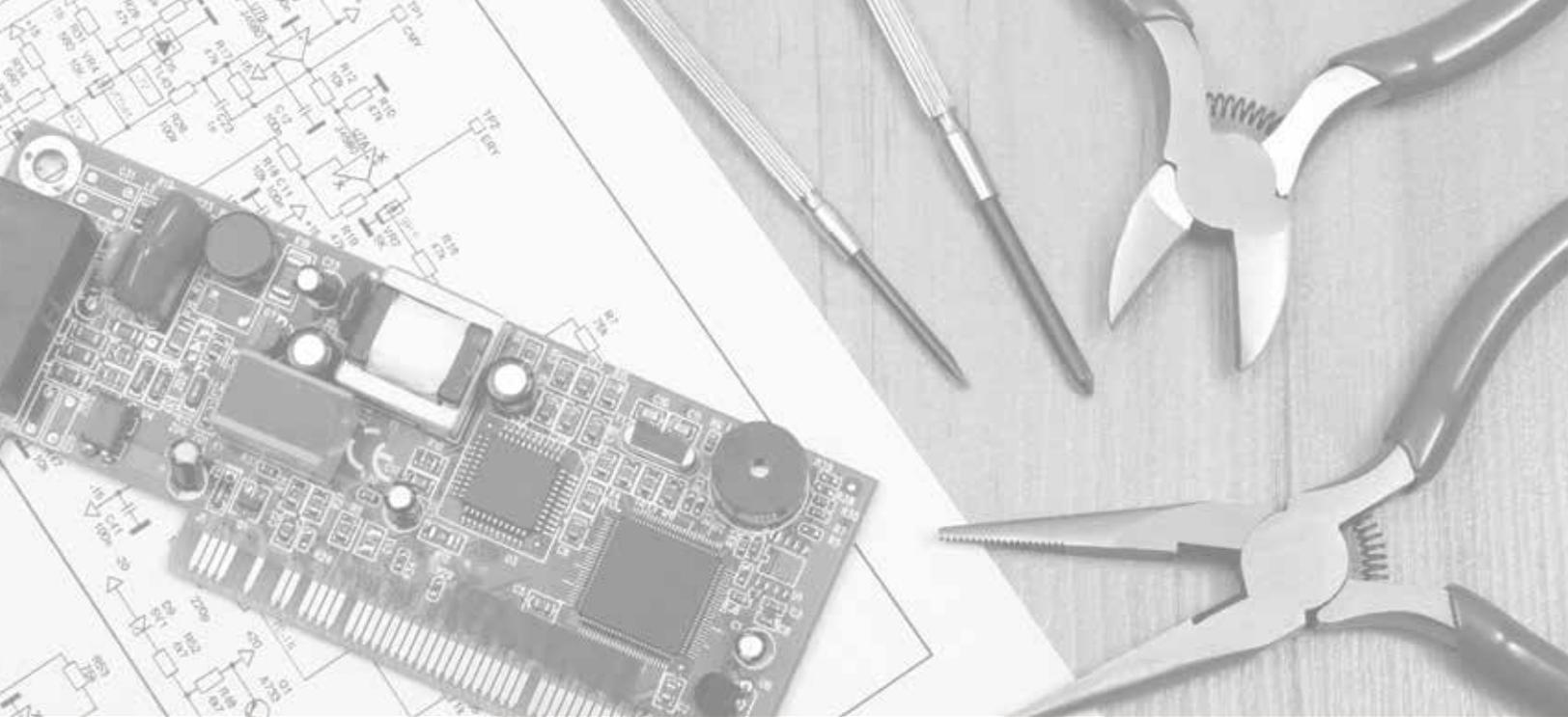
1. Micro vias: 10mil pads with 5 mil laser drills, centered in the BGA pads, layer 1-2
2. 3 mil traces with 3 mil spacing: outer two rows of pins fanned out on component side between pins
3. Plow-through routing: ACDi's proposed solution

**Option 1** would have changed the stack-up of the design, resulting in higher fabrication costs (due to micro-via), and adjusting routing of existing circuits that had already been proven to work

**Option 2** would have increased the cost to fabricate the board due to the tighter than industry-standard spacing requirements, and potentially would have caused issues at assembly

### RESOLUTION

**Option 3** ACDi realized there were 7 pins that could not be fanned out with thru vias that were necessitating these proposed solutions. We reached out to Toshiba to determine the pin-use of the adjacent pins. After confirmation from Toshiba that some of these pins were no connects inside of the IC, we were able to "plow-through" route these adjacent pads, and fan out directly to thru via. The existing stack-up was maintained, the fabrication limits did not increase, and ACDi was able to reduce board costs by up to 20% while still outputting a quality design.



## ACDI PRODUCT ENGINEERING SERVICES

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### Software Tools

Our designers utilize industry standard professional PCB design software, including:

#### Mentor Graphics

- Expedition 7.9.4
- PADS Power PCB 9.5
- PADS PowerLogic Schematic Capture
- PADS BlazeRouter
- DX Designer

#### Cadence

- Allegro Expert 16.6
- Concept HDL Schematic Capture
- OrCAD Schematic Capture
- SPECCTRA Autorouter

#### Altium

- Altium Designer 14.3
- Altium Schematic Capture

#### Eagle

- 6.5.0 Professional

#### Stack-up Builder

- Polar Si 8000
- Polar Speedstack 2014

### PCB Layout and Design Strengths

- High frequency, RF designs
- High speed digital designs
- Multiple layers – up to 26+
- Low EMI designs for sensitive applications
- Stacked, blind, and buried vias
- Power supply
- DDR2 and DDR3 memory
- Analog designs
- PCIe, USB 2.0 & 3.0, LVDS

