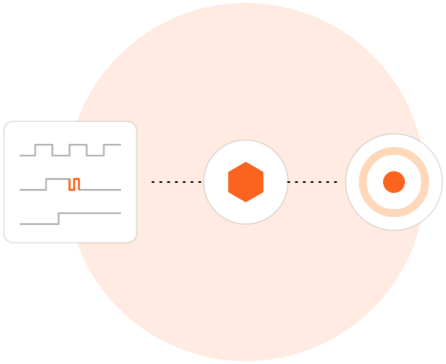
Root cause analysis, from days to minutes

How Whalechip isolated critical design bugs with agentic AI.



ChipAgents Helps Whalechip Cut Semiconductor Root Cause Analysis from Days to Minutes

Challenge:

As semiconductor designs grow increasingly complex, engineering teams face mounting pressure to identify and resolve critical design issues faster without compromising verification quality or delaying development schedules. Traditional debugging and root cause analysis (RCA) workflows rely heavily on manual waveform inspection, simulation log analysis, and fragmented design data, creating bottlenecks that consume significant engineering resources and slow the path to tapeout. As advanced packaging technologies such as 3D ICs introduce additional design complexity, identifying the underlying causes of failures becomes increasingly challenging.

Whalechip, a semiconductor engineering company with hands-on experience in 3D IC and Wafer-on-Wafer mass production, faced these industry-wide challenges while debugging a new chip design. With limited visibility into the source of complex design issues, engineers relied on logs and indirect system signals to reconstruct failures and identify their root causes. This time-intensive process made it difficult to isolate subtle structural and timing issues efficiently, increasing the risk of prolonged debugging cycles and project delays.

Solution:

In response, Whalechip deployed ChipAgents, an autonomous agentic AI platform purpose-built for semiconductor engineering and complex root cause analysis.

Moving beyond the capabilities of generic coding assistants, ChipAgents uses specialized semiconductor AI agents to analyze specifications, simulation logs, waveforms, and other engineering data to identify underlying design issues and generate actionable debugging insights. By automating complex analysis across multiple data sources, the platform reduces the manual effort required to trace failures and helps engineers identify critical bugs more efficiently.

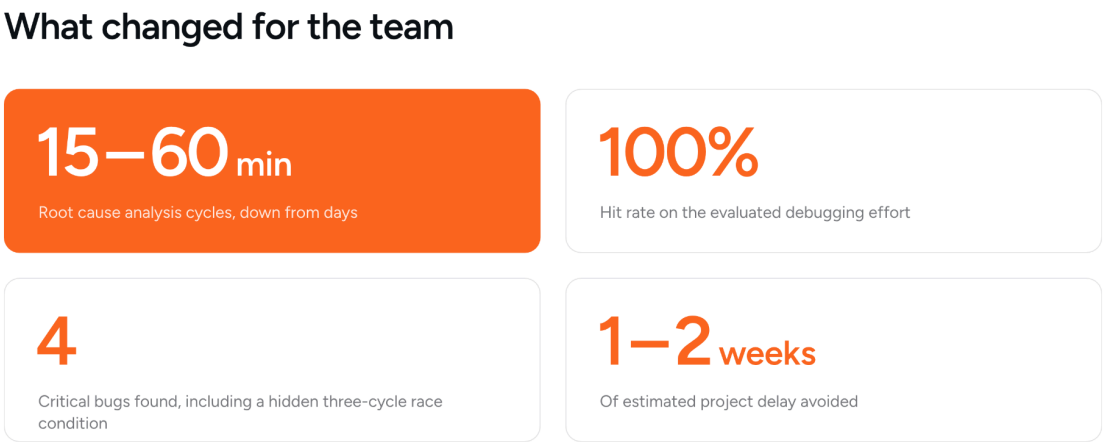
During a 60-hour debugging effort, ChipAgents identified three complex structural pitfalls involving gated clock conversion, clock self-brick, and removal violations. The platform also uncovered four critical bugs within a customer memory controller, including a hidden three-cycle race condition that would have been particularly difficult to diagnose using traditional methods.

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> As chip designs grow more complex, root cause analysis has become a critical bottleneck in development. As a company with hands-on 3DIC and Wafer-on-Wafer mass production experience, ChipAgents enabled us to isolate design bugs significantly faster, a capability that will only grow more important as 3D stacked die interactions introduce ever-greater debugging complexity.
>
> **Thomas Tsai**
> CEO, Whalechip

Results:

By leveraging ChipAgents, Whalechip significantly accelerated root cause analysis and reduced the engineering effort required to identify critical design issues. In its deployment:

- **Root cause analysis cycles decreased from days to as little as 15–60 minutes**, dramatically accelerating debugging workflows.
- **Achieved a 100% hit rate** in identifying the underlying issues during the evaluated debugging effort.
- **Uncovered four critical bugs**, including a hidden three-cycle race condition within a customer memory controller.
- **Helped prevent an estimated one to two weeks of project delays** by identifying and resolving critical design issues earlier.



Conclusion

Together, Whalechip and ChipAgents demonstrate how domain-specific agentic AI can transform semiconductor debugging and root cause analysis, helping engineering teams move from time-consuming manual investigation to faster, more autonomous identification of critical design issues.

The Whalechip deployment reflects a broader challenge facing the semiconductor industry. As chip architectures become more sophisticated and 3D integration introduces new layers of complexity, traditional debugging methods are becoming increasingly difficult to scale. With ChipAgents, engineers can reduce time spent searching through logs, waveforms, and fragmented design data, allowing them to

focus on resolving critical issues, accelerating development cycles, and bringing complex semiconductor designs closer to tapeout