Spotfire®

Renesas drives yield, quality, and operational efficiency with Spotfire®

Billions of data points analyzed across multiple teams

Challenge

Headquartered in Tokyo, Japan, Renesas Electronics is a global leader in embedded semiconductor solutions, powering innovations in automotive, industrial automation, IoT, and infrastructure. With a history of engineering excellence and a global footprint, Renesas delivers reliable, high-performance technologies that are foundational to modern smart devices and systems.

Semiconductor manufacturing is among the most complex, capital-intensive industries in the world. From the rising intricacy of chip design to the variability of manufacturing processes, improving yield while maintaining consistent quality is an ever-growing challenge.

Renesas faced several critical roadblocks. Its manufacturing processes generate billions of datapoints across fabrication (fab), test, and assembly lines. Yet the company was relying heavily on static reports and siloed spreadsheets, which limited agility and slowed analysis. This made it difficult to identify root causes quickly, impacting time-to-market and profitability. Adding to the challenge, Renesas teams around the globe were using disconnected systems, which stifled collaboration and slowed collective decision-making.

"Our existing tools, manual reports, and spreadsheets were no longer sufficient to manage the scale and complexity of our data," explained Moumita Bardhan, Director of Manufacturing Applications at Renesas. "These traditional methods lead to delays in root cause identification. As semiconductor analysis relies on massive datasets, often encompassing billions of data points, establishing a scalable, efficient, and accurate process under such conditions proved extremely challenging."

Cross-functional team collaboration was critical for the large, globally distributed organization, but the lack of a unified analytical platform slowed down communication and alignment across teams, leading to delayed decision-making and business inefficiencies.

"Spotfire enabled proactive, not reactive, decisions. We improved yield, reduced retest costs, and laid the foundation for predictive analytics."

—Moumita Bardhan, Director of Manufacturing Applications, Renesas

Solution

To overcome these limitations, Renesas turned to Spotfire®, the visual data science platform built for high-tech, data-intensive environments. Spotfire quickly became a cornerstone of Renesas' digital transformation strategy, supporting both historical analysis and future-forward initiatives like predictive analytics.

Since its initial adoption in 2005, Spotfire has enabled Renesas to integrate heterogeneous data sources from fabs, test facilities, and assembly lines in real time. Engineers and analysts now build interactive, customized dashboards tailored to their specific workflows. The platform's support for advanced analytics, including clustering, pattern recognition, and correlation analysis, allows teams to explore data deeply and extract actionable insights. Spotfire also fosters secure collaboration across regions, ensuring that data-driven decisions can happen faster and more transparently.

Spotfire gave engineers, analysts, and process experts the tools to move faster, explore deeper, and make decisions with confidence.

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Renesas has operationalized Spotfire across dozens of use cases, ranging from strategic yield optimization to frontline defect tracking. Examples include:

Special zone analysis

Engineers use Spotfire to isolate and analyze edge zones, center zones, and other wafer-specific regions to detect localized process deviations. This leads to faster root cause identification and improved process tuning across production lines.

Statistical bin and yield limit monitoring

Spotfire enables Renesas teams to evaluate materials against Statistical Bin Limits (SBL) and Statistical Yield Limits (SYL). By identifying parts that deviate from optimal thresholds, engineers are able to tighten process windows and drive targeted yield improvements.

Limit management and specification tuning

Through Spotfire dashboards, teams continuously evaluate the impact of specification changes on product yield, reliability, and cost. This capability allows Renesas to strike the optimal balance between customer requirements and manufacturing constraints.

Return material analysis

Spotfire supports wafer map reconstruction for returned customer material, enabling rapid isolation of defective zones. This speeds up failure investigations and enhances customer trust through transparent, data-backed root cause analysis.

Analysis that once took days now takes hours.

The results

With Spotfire, Renesas has transformed its semiconductor manufacturing analytics. Real-time access to data across fab, test, and assembly operations has significantly shortened the time required to investigate and resolve issues.

What once took days now happens in hours. Yield analysis accelerated significantly, leading to measurable improvements in material utilization, reduced retest costs, and enhanced process stability and product quality.

With improved cross-team collaboration due to a unified data platform, teams are able to make data-driven decisions faster, and more consistently.

Most importantly, Spotfire has helped Renesas build a scalable foundation for AI-driven process optimization, ensuring the company is well positioned to thrive in an increasingly competitive, fast-moving industry.

Renesas Electronics Corporation is a premier supplier of advanced semiconductor solutions, including microcontrollers, analog, power, and SoC products. With a global network of design and manufacturing facilities, Renesas powers innovations in automotive, industrial, IoT, and infrastructure sectors.

Looking ahead

Renesas is scaling Spotfire across its global operations with several strategic goals. The company is focused on consolidating its enterprise analytics toolset to eliminate redundancy and reduce costs. It is also moving toward repeatable, automated reporting processes that save engineering time while ensuring consistency. As predictive analytics becomes increasingly important, Renesas plans to operationalize machine learning models for tasks like yield prediction and early anomaly detection.

Just as important, the company is investing in a self-service analytics culture that empowers engineers to explore, visualize, and share data independently—accelerating decision-making at every level of the organization.

"Spotfire gives users the freedom to create their own dashboards and drive their own insights. It's one of the features I personally like most."

—Moumita Bardhan, Director of Manufacturing Applications, Renesas

Ready to get smarter with Spotfire visual data science? Talk to an expert today at spotfire.com/contact-us.

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Spotfire® is a visual data science platform that makes smart people smarter by combining interactive visualizations and advanced analytics to solve complex, industry-specific business problems.

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