With Data Analytics, Accurate and Faster Design Decisions Follow

PATHWAVE

Design engineers are in a race to innovate, design the best product, and be first to market. As a result, they must make informed, timely design decisions, but this can be quite challenging. Obstacles like potential engineering resource shortages, budget constraints, and the need to sift through enormous amounts of data to ensure designs meet industry and company guidelines often stand in the way.

Fortunately, the secret to making more informed design decisions comes down to one powerful tool: data analytics software. Integrated data analytics software allows engineers to work in shorter design cycles, reduce the number of redesigns, and benefit from an integrated design and test workflow that increases productivity and minimizes risk.

Benefits to Engineers Using Data Analytics Software

- Faster decision-making
- More accurate predictions
- Consistent data capture, display, and visualization
- Lower overall project cost
- Improved time-to-market

Common Design and Test Flow Challenges

Companies often underestimate the enormous complexity in managing and analyzing design and test data across multiple platforms, groups, and sites. Ensuring everyone uses the same data format is painful, especially if multiple engineers from multiple sites are involved. Engineers often spend a lot of time working with Excel spreadsheets, creating pivot tables to present data to their managers in a way that facilitates the decision-making process. But with many test environment requirements, they also spend a significant amount of time just filtering the pivot tables to present their data succinctly and correctly.

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The complexity of today's designs, including tight margins and more measurement requirements, presents a great challenge for designers who continue to use legacy data analysis methods. Lack of visibility and consistency in the way data is presented causes engineers to misinterpret test data, resulting in project delays and increased cost. Additionally, when engineers perform information technology (IT) functions like managing test databases and creating pivot tables, they are not doing the job for which they were hired—designing the best product for their customers.

Engineers want to design the best products for their customers, but often get bogged down in the details of data analysis.

Finding a Solution

Modern data analytics software packages are the answer to overcoming data analysis challenges. Setting up data analytics software requires two major components to be successful. The first is a collection of data visualization tools. The second component is a reliable repository to host and secure the data.

In the test and measurement industry, designers use test equipment and compliance tests to determine if their designs meet industry criteria for device certification. A prime example are the high-speed standards like USB, PCIe, and JEDEC for memory devices. These standards include published device test specifications and procedures for designers to test against using test equipment like oscilloscopes and bit-error-rate testers with compliance test software.

Data sources can include results from simulation software, multiple-vendor test equipment, and an individual company's proprietary measurement tools. Data collected is exported to a data-repository server or cloud, which is accessible by a globally distributed design and validation team. Teams from different sites can contribute and retrieve the test results in a standardized format for analysis purposes.

Importance of Visualization

Data analytics software with powerful visualization tools makes the decision-making process much more intuitive and significantly faster. Standard visualization tools include line and histogram charts with pass/fail limits and statistical information. Using these tools, engineers can analyze measurement results with different properties such as temperature, different versions, test bench setups, and others.

Visualization tools make the decision-making process more intuitive and significantly faster.

Figure 1 shows an example of a histogram plot of different ASICs. It reveals that two ASICs, SERDES 700 and SERDES 701, both have the same histogram mode and profile. In contrast, SERDES 702 does not have enough measurement data to conclude its performance.

Based on this information, a manager may instruct his/her team to make more measurements on SERDES 702 before a decision regarding release to production can be made. In this case, the visualization tool not only brought the data to life, but ensured it was easy to share and understand.
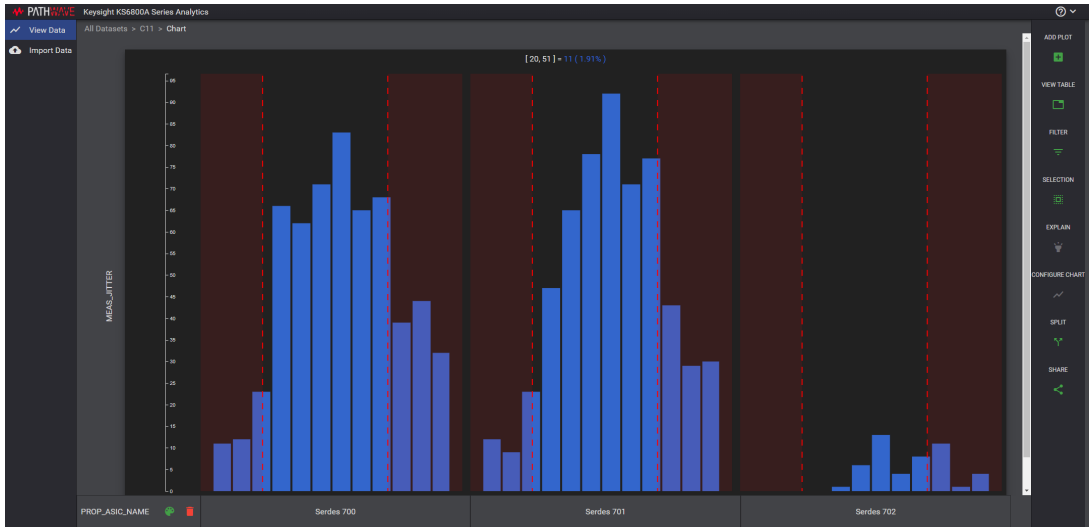

Figure 1. Histogram plot of jitter measurements on three different SERDES

In Figure 2, a plot of a bit-error-rate measurement against input voltage for different ASIC versions is shown. Notice that the alpha, beta, and gamma versions have the same bit-error-rate measurements, while the delta version performs better with a lower bit-error measurement.

Using the single view provided by the visualization tool, comparing all four ASIC versions is easy. The team might conclude that the delta version ASIC has better performance compared to the other versions. It might also investigate possible reasons for data discrepancies, such as differences in test equipment, test bench setup, or even the engineer who made the measurements. Both options are possible because the visualization tool presents the data in an easily sharable format that facilitates timely decision making.
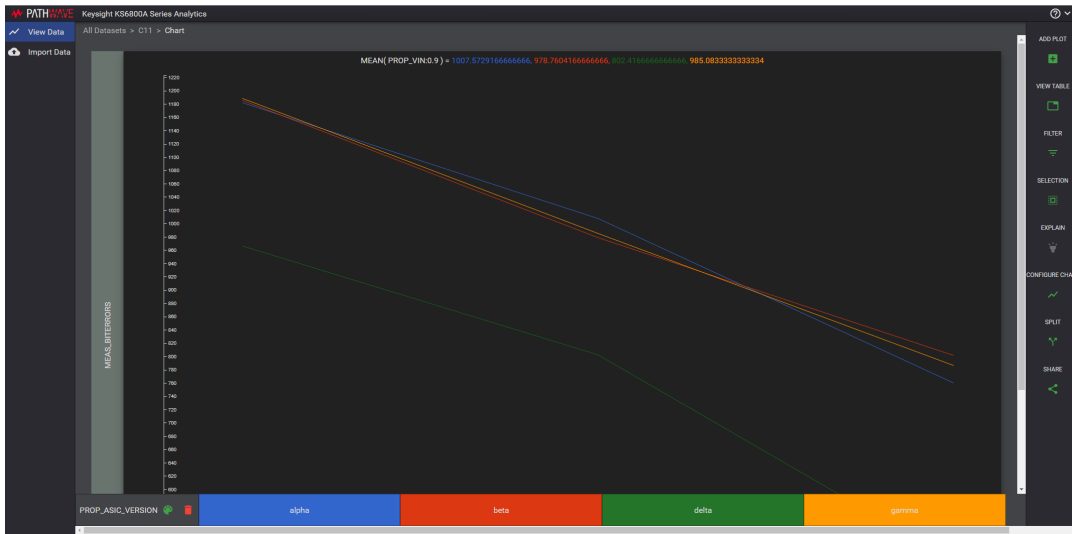
Figure 2. Line plot of bit-error-rate on four different ASIC versions

Setting Up Data Analytics

Customizing the visualization tool is the first part of setting up data analytics. It is also necessary to set up a web server that interacts with the data repository server for data upload and access. The data repository server must be secure and support backup, restore, and replication.

The web server hosts the data analytics application software. It must support massive data upload via streaming or bulk transfer. The data should be accessible in real time, operating system independent, and programming language independent, which means that a user can upload data via any data import programming script, such as Python, C#, C++, or Java script. The web server must also use HTTPS for secure data transfer within the company's network and protect the data from any corruption. It is the web server's job to enforce data consistency so that the same kind of format will always be imported to the repository.

It is recommended that the web server and data repository server be set up using two separate servers. This set up allows for scalability, performance, and data-repository security.

Servers for data analytics should be accessible in real time, operating system and programming language-independent, and secure.

Thoughtful server setups ensure scalability, performance, and data-repository security.

Data Analytics Matters

In today's complex design environment, design engineers and managers need confidence that their designs meet company and/or industry standards. They also need to create the best products possible in the fewest amount of design cycles to ensure they are first to market. Being ahead of the competition and doing it in the most cost-efficient manner possible, positively impacts a company's bottom line.

Data analytics software is the ideal way to deliver on these needs. Designed to work with all measurement data collection methods, it allows for simple, quick, non-tedious integration into any design and test work flow. Easy integration means engineers can focus on their design work, rather than spending time graphing and analyzing test results.

The trick lies in identifying the right data analytics software to use. The optimal solution features a web server application that enables real-time import and access to huge amounts of data. It should also support visualization tools with different chart options that enable fast and intuitive data analysis to inform quick decisions. Together, these two elements build a solid infrastructure that supports data analytics in any design and test workflow.

For more information on data analytics for test and measurement, go to **PathWave Test Software**. More information on connecting design and test software, is available at: **PathWave Software Platform**.

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