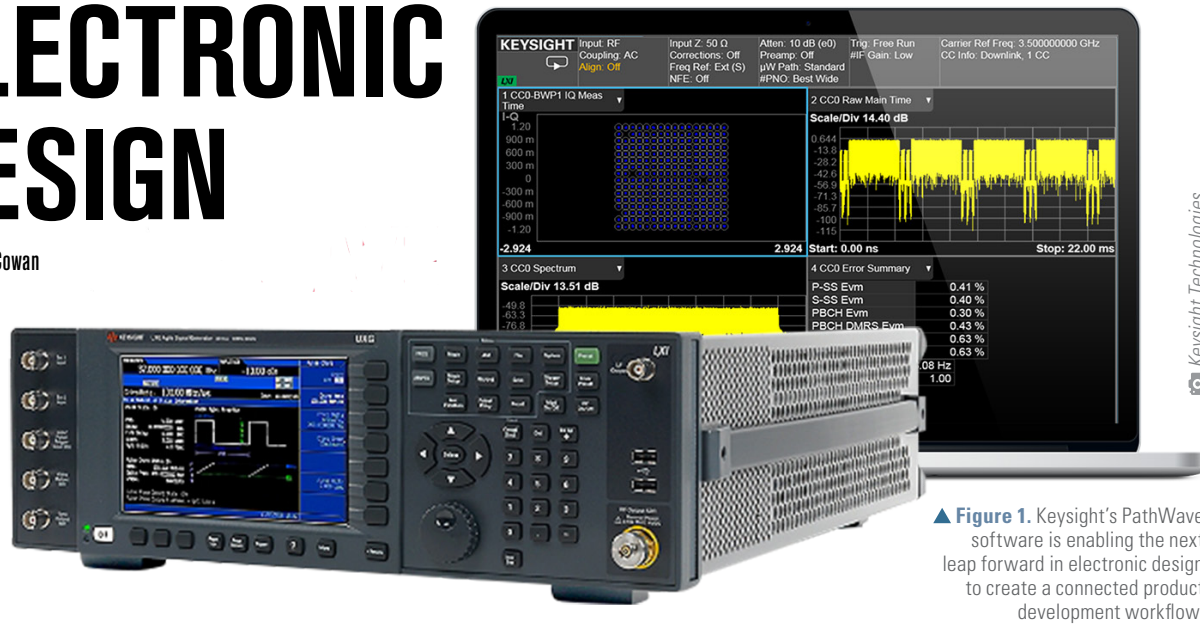
ENABLING THE NEXT LEAP FORWARD IN ELECTRONIC DESIGN

by Anna McCowan



Keysight Technologies

▲ **Figure 1.** Keysight's PathWave software is enabling the next leap forward in electronic design to create a connected product development workflow.

In this age of engineering marvels, technological advancement is hard to miss. Horse-drawn carriages have given way to autonomous driving, landlines have been replaced by smartphones, and the list goes on. Throughout history, as technology has advanced, the design process has also had to advance to keep pace and support new development efforts. Proof of that fact is everywhere.

For example, before the advent of electronic design-automation (EDA) software, electrical engineers designed with lightboards and stencils, similar to the process used by mechanical and architectural engineers. By the 1970s, the circuitry and overall size of circuit boards began to shrink. During this time, development for the first "place and route" software tools occurred. These tools consisted of two steps: placing all electronic components, circuitry, and logic elements and routing all wires needed to connect the placed components. With this advance, designers gained the ability to graphically place components and wires on a board with greater accuracy and precision.

In the late 1970s, the use of silicon increased the complexity and variety in the types of chips in development. In response, larger electronic companies like Hewlett-Packard began producing the first of what is today recognized as EDA software. Although initially used as an internal tool, EDA software soon grew into an entire industry.

Another evolutionary leap forward in the design process was necessary in the 1990s. Designing electronics by hand grew impossible as chip sizes decreased, and chip complexity increased. To keep advancing state of the art chip development, designers needed a new way of doing things. The answer came from EDA software, and it quickly emerged as an essential tool in every design engineer's tool kit. Integrated circuits (ICs) became the differentiator. More companies started specializing in IC design—completely changing how they designed and manufactured electronics.

The fork in the road

Today, the electronics industry is at another crossroad. Modern electronics include chips with hundreds of thousands of gates, and support multiple types of wireless technology. They are smaller, faster, and less expensive. Also, designers are continuing to push the limits of what's possible to quench consumer demand for electronic devices with even more functionality at less cost.

Exciting times are ahead, and that bodes well for consumers. However, it also puts even more pressure on modern design and test engineers who are struggling to keep up with demand. The

design process must advance yet again to keep pace with emerging technologies. However, what will that advancement look like?

Currently, teams in the design and test industry work in a siloed environment, and their software tools do not talk to each other. Designers develop *ad hoc* solutions to keep up with developing increasingly complex electronics, but this approach is not sustainable.

Design complexity is only going to increase from here, and that means it's a pivotal time for designers. There is a fork in the road for the entire electronics industry. Without a radical change to the design process, the development of electronic devices will falter under the weight of the increasingly difficult design task at hand.

Big changes ahead

The radical change that is necessary to keep pace with advanced electronic development is a profoundly new way of looking at design and test. The electronics industry needs to embrace a fully integrated design-and-test process rather than a siloed approach. Integrated agile design-and-test processes reduce time-to-market and enhance productivity. By breaking down the barriers between design-and-test teams, engineers can finish projects more quickly, with less trouble and risk. However, that is only a fraction of the benefit it promises.

Using integrated design-and-test software makes business more agile and accelerates workflows by removing bottlenecks like data transfers and file conversions (**Figure 1**). Being able to design and test products faster also means reduced development costs. These are benefits any electronics company would want. We expect our personal devices to be faster and more connected. Why wouldn't we expect the same from the tools we use to design and test them?

A better path forward

Enabling the incredible advances and innovations in 5G, automotive and energy, and IoT requires equal innovation in the design and test processes used by today's engineers. That innovation must include the adoption of a connected design and test workflow. The advantages of adopting this approach are substantial for both engineers and consumers alike. It promises a huge leap forward in the development of electronic systems, with benefits that are visible at every point of the product lifecycle. EE

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