

CUSTOMER CASE STUDY

Low-cost analogue/mixed-signal layout tools boost productivity and complement high-end EDA at UK's leading RF IC design centre

Following Harold Wilson's call in 1960 for British industry to embrace the "white heat of technology", three Cambridge University students founded the first contract research, design and development company in the UK. They called their new company Cambridge Consultants

Today, as a world-wide leader in contract design and development, the company's services span a range of demanding market sectors, including communications, healthcare, automotive and defence. With applicability in all of these sectors, wireless product development is a significant and fast-growing part of Cambridge Consultants' business, employing over 45 of the 230 design engineers based at their Cambridge facility. The company is involved with wireless system and IC design for everything from professional radio to wireless video

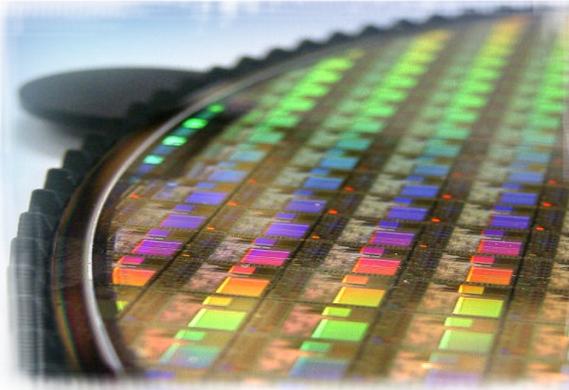


Figure 1. Cambridge Consultants design advanced mixed-signal chips for everything from professional radio to wireless video and mesh networks

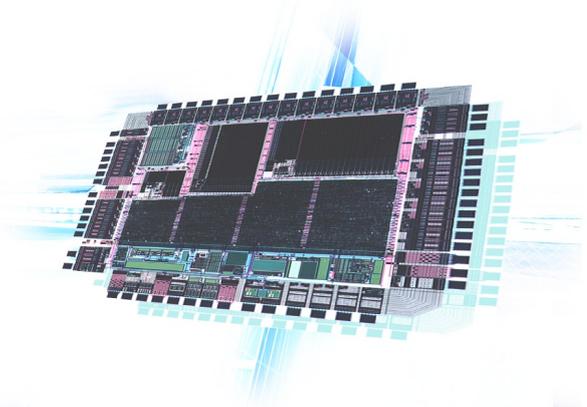
and next generation mesh networks (Fig1). Cambridge Consultants work is typified by being challenging and leading edge and they are at the forefront of design and development for technologies such as Bluetooth, ZigBee, UMTS, UWB and DAB, in addition to proprietary design achieving ultimate performance for specific applications. CSR, market leader in the Bluetooth silicon market, is one of the company's notable 'spin-outs', whose products are used in over 60% of the world's qualified Bluetooth end products and modules. Additionally, Alphamosaic, whose advanced video processing ICs are set to revolutionise low power consumption mobile products, is another success from the Cambridge Consultants stable.

In every design project they undertake, time-to-market is a vital issue for Cambridge Consultants and its customers, so design productivity and selection of the most appropriate EDA tools is critical in meeting customer expectations. 90% of designs are mixed-signal and customers range from those with no capability or experience in ASIC design to those with substantial experience and their own in-house resources and workflows.

Some years ago, the company decided not to adopt the route of a fully integrated design flow. Instead, they selected optimum tools for their requirements at each stage of the process, providing the performance, flexibility and usability demanded by their work. HCS from Cohesion Tools is used for schematic capture, Mentor Graphics' Eldo for RF simulation and Calibre for design verification. Layout is performed using Tanner EDA's L-Edit Pro. L-Edit Pro is a highly proficient and flexible, yet relatively low-cost, PC-based tool for analogue and mixed signal design. To improve integration within the overall design flow Tanner has recently added some new features, including a browser for reading in DRC error log files produced by Calibre (Fig2). Cambridge Consultants has used the tool in almost every design they've created over the last 10 years, from low-volume designs for space applications to high-volume software radios.

The company's Business Unit Manager for Wireless, Richard Traherne, explains the thinking behind their approach:

"Our philosophy is to select the most cost-effective tool for a particular engagement. Additionally, we have to be capable of managing a wide variety of jobs - our designs operate from DC to 5GHz. We frequently push the capabilities of tools in our work and we need to be able to customise them when necessary. That's something that is easy to do with L-Edit Pro; it's very straightforward to write our own device generators, for example. Another important consideration is the time it takes to learn to use, or re-acclimatise, with the tool. We have to pull design teams together very quickly, start projects quickly and deliver them quickly - L-Edit is a great help in that respect and its simplicity also reduces our need for CAD support."



Les Nuttall, a Senior ASIC Design Consultant at the company, points to other advantages of using the L-Edit tool:

“Inherently, as more complexity and automation is introduced into EDA tools you become more divorced from what’s going on. Our design flow using L-Edit Pro means that we are able to view the design at a lower level than if we were using a more automated solution. This has the advantage of allowing us to use the tools in a more advanced manner and also to spot errors early and correct them early. This transparency is not so easy to achieve with more integrated tools.”

Unsurprisingly, some customers perceive potential issues with fragmented workflows. Additionally, those that have their own ASIC design flows, and that’s around half of them, want the company to match them as closely as possible for easy transfer of designs. However, if Cambridge Consultants were to adopt a high-end integrated design flow from one of the larger EDA vendors, it could disadvantage many of its other customers who want to develop in-house design capabilities on more limited budgets. Les Nuttall has found that the majority of the concerns of customers with existing design flows do not cause problems in practice.

“Some customers perceive that there is potential for errors at the interface of different tools, but this has never been a real issue. What is more important is clear visibility of what is going on within the tools and a robust design flow that maximises the benefits of the individual tools, when they are brought together. We have developed our flow over many years and have an excellent track record of first pass success.”

Richard Traherne points out an added benefit of using a PC-based tool like L-Edit - its portability:

“We have a Tanner commuter license enabled by dongle. This means we can work while we’re travelling, at home, or at customer premises. It can sometimes be very useful to carry out live editing at customer premises and then check it out later, as we did recently when we needed to move a port over a couple of microns. Portability gives a boost to both customer service and design productivity, and it’s something we would not be able to do with UNIX-based tools.”

In summary, L-Edit provides flexibility, ease-of-use, transparency and portability for the Cambridge Consultants wireless IC design team - all of which contributes to them maintaining their reputation as the UK’s leading RF design consultancy.

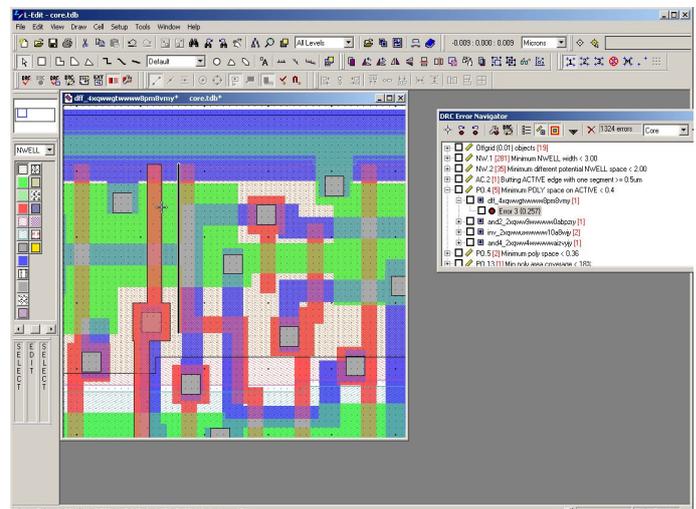


Figure 3. L-Edit Pro facilitates working with other tools by including a browser for reading in DRC error log files produced by Calibre