



Reverse engineered?



System level considerations often provide the starting point for the design cycle. By **Vanessa Knivett**.

System design can no longer be considered as the final part of the design process. Whether reviewing design for manufacture (dfm) or design for test (dft) techniques or considering components that used to be relegated to the last piece of the design jigsaw, system design encompasses fundamental decisions, prompted by considerations such as environmental performance, power consumption and WEEE and RoHS compliance.

Increasingly, designers are moving away from the 'clean sheet of paper' approach in favour of starting from a reference design. The benefits are varied, but include letting someone else worry about standards, allowing the designer to concentrate on product differentiation.

Reference designs are available for 'bog standard' tasks, such as On Semiconductor's GreenPoint power management solution, catering to 60W power adaptors. On the release of the design in June, the company commented: "This new reference design addresses the sometimes tedious design challenges inherent in meeting both standby and active mode energy efficiency regulations, and yet, it offers a cost effective solution." Compliance with CEC, Energy Star and the European Code of Conduct might entail

a lengthy design process, but with an 88% energy efficiency assured, On Semiconductor is banking on designers having better things to think about than power adaptation.

Growing complexity

But more complex reference designs are appearing in response to new and evolving standards and applications – home base-stations/femto cells for example – where level of uptake may be hard to predict initially. Some recent examples involving emerging standards are fixed and mobile WiMAX – notably, picoChip has produced fixed and mobile WiMAX base-station designs, and customer premise equipment is being served by a joint venture between Atmel and WaveSat (pictured here).

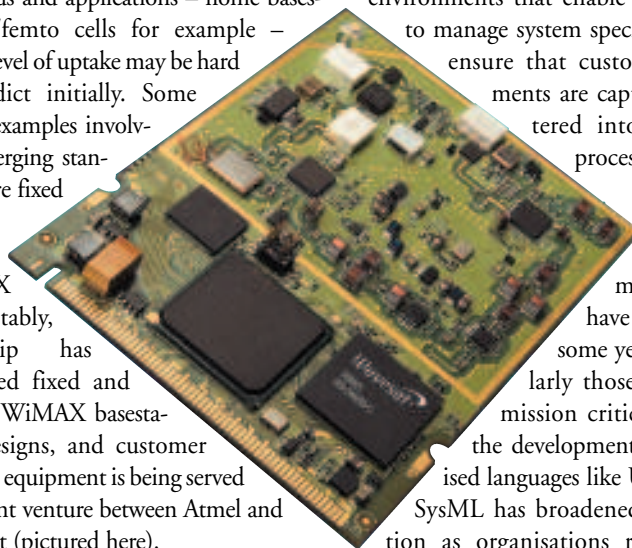
For markets catered to by WiMAX or HSDPA/HSUPA, time is of the essence and a reference design produced by a company close to the standard development efforts can be a low risk way to go. But

with reference designs growing in sophistication, some now offer the sort of fully featured approach that customers might not be able to achieve on their own.

If you are not working to a reference design, then you will no doubt be grappling with increased design size and complexity. These parameters have prompted the need for more sophisticated software environments that enable design teams to manage system specifications and ensure that customer requirements are captured and filtered into the design process.

Whilst these higher level system modelling tools have been used for some years – particularly those working on mission critical systems – the development of standardised languages like UML 2.0 and SysML has broadened their adoption as organisations recognise the improvements in communication that can be achieved, as well as promoting design reuse and early design validation.

With companies like Artisan Software and Telelogic offering more scaleable





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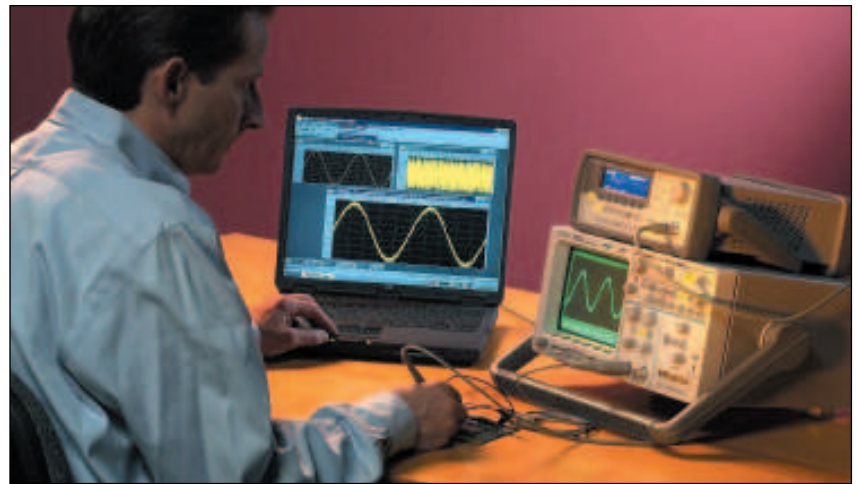
tools, expect to see a visual means of planning system architecture coming to a desktop near you.

Speed of design is invariably as critical as accuracy for many projects, thanks to time to market windows. And design teams have never been under as much pressure to make products smaller, faster and cheaper.

On a physical level, this is manifesting itself in a demand for high speed serial I/O and smaller, more densely packed systems, evidenced by several recent mezzanine developments, including VITA's developing 56 standard – a new front loaded mezzanine specification with built in hot swappability (speed of use in the field being the driving factor).

Hot swap is a theme that abounds, but it is a feature that should be considered in any system design that requires the user to modify hardware.

It was a fundamental part of the design philosophy behind one of the neatest data acquisition packages to launch this year –



Agilent's 33220A LXI certified 20MHz function/arbitrary waveform generator offers 11 standard waveforms plus pulse and arbitrary waveforms.

National Instrument's CompactDAQ (pictured below). The package consists of an eight slot chassis that accepts hot swappable, auto detectable I/O modules capable of measuring up to 256 channels of electrical, physical, mechanical and acoustic signals, and offering signal conditioning capability. Crucially, the device makes use of usb 2.0 capability to connect the C series I/O modules to the chassis.

With a dedicated a/d converter per module, the package allows engineers to take a 'mix and match' approach to module choice. It's been designed for what NI considers as 'the heartland of data acquisition' (2 to 5Msamples/s speeds and resolutions of up to 24bit), so will be used by novices and expert test engineers alike.

A more flexible, modular approach does of course lend itself to test – where investment in technologies that can scale to future technologies are welcomed.

LXI, GPIB's LAN based successor, seems to at last be coming to fruition, with support from multiple test vendors.

Billed as the next generation of modular architecture standard for automated test sys-

tems, it addresses the need for a high speed instrumentation interface standard, but also takes into account the need to reduce the time it takes to set up, configure and debug test systems. Though designed with aerospace and military designers in mind, the concept of achieving a smaller footprint by removing front panels, displays, and expansion cards to shrink the physical size of deployed systems, is a good one.

Whilst it's likely that R&D engineers will continue to use traditional instruments, the modular concept could provide benefits up the design chain, beyond ATE, as some LXI modules will be self contained instruments while others will be functional building blocks, depending upon the application. Whilst Agilent and others have already launched LXI certified product, such as an LXI compliant function/arbitrary waveform generator, the final specification is imminent and there will be many more LXI compliant products coming on stream later this year.

The biggest challenge facing next generation mobile device developers is finding a balance between providing further functionality and more power, and working within the limitations of existing power resources.

Battery power isn't likely to increase significantly in the near future, so it will be up to changes in the power architecture to get more out of existing power resources. Supercapacitors can provide a boost of



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Myrddin Jones, **OLED-T**

power when it is needed, and then recharge from a conventional battery. The ability to deliver a short spike of power/high pulse power addresses one of the few weaknesses in normal alkaline batteries.

Australian supercapacitor company Cap-XX is targeting mobile phone applications, particularly those that require more power in order to produce brighter flashes and therefore higher resolution images. Its BriteFlash power architecture can power a flash led, addressing the problem of blurry photos resulting from long flash exposure times that have traditionally compensated for low light conditions.

In terms of efforts to get more out of existing architectures, they were summed

Thin enough to fit into a mobile phone, supercapacitors are set to have a big influence in consumer products.



Toshiba Matsushita Display Technology is using optical compensation technologies to enable transmittance without absorption. The result is a daylight readable screen.

up by Nazzareno Rossetti, Fairchild Semiconductor's senior director of strategy in its analogue products group, as trying to squeeze out the last drop of power from a lithium battery, or edging the 95% efficiency of a typical voltage regulator that bit closer to perfection. However, he challenged the value of these efforts, when one bears in mind the potential impact of oleds, fuel cells and power amplifiers. There is value in these efforts, he said, but added: "Let's not get fixated on incremental improvements."

OLEDs come closer

Mass manufacture of oleds was brought a step closer with the announcement in June that oled pioneer Cambridge Display Technology (CDT) and Litrex are developing an inkjet printing solution capable of producing oleds with a resolution of 200pixel/in. The technology, which will make backlights redundant, also doesn't require high voltages and will thus better suit portable applications.

Recent refinements in fuel cell membranes have led to significant increases in power levels. At the start of the year, PolyFuel said that its latest hydrocarbon DMFC membrane – which is 45µm thick compared to the previous 62µm – has brought a 33% increase in power from a passive direct methanol fuel cell (DMFC).

Jim Balcom, president and ceo of

PolyFuel claimed the latest development makes the application of DMFCs in power hungry mobile devices more likely.

Meanwhile, British start up Bac2 has just received seed funding to further develop a polymer material that conducts electricity. This has implications for fuel cells because the material could be used for the bipolar plates and end caps. Thought of as cheaper to produce than existing materials and lighter than metal alternatives, which can also poison the platinum catalysts, the breakthrough might speed the commercialisation of fuel cells.

Bac2 is just one example of the role British firms could play in the development of multiple power paradigm changing technologies – if the right funding and infrastructure is in place to support them. Another important player could be oled maker OLED-T, which has just invested £900,000 in a new R&D facility at Brunel University Science Park.

Observed Myrddin Jones, OLED-T's ceo: "The oled market is growing incredibly fast and the opportunities for the future of the technology, especially in small form factor displays such as MP3 players and mobile phones, are massive." 