



Boxing clever

It's two months since Welsh digital set top box (stb) designer TVonics Solutions was bought by its manufacturing partner Contact Holdings. In just over four years since its inception, TVonics has created a range of digital tv receivers and recorders, both under its own name and for a number of other well known brands.

TVonics has a reputation for ease of use and energy efficiency and the company has built a loyal following from a public increasingly willing to consider carbon footprint and 'buy British'.

Unusually, TVonics' manufacturing and design are currently done on the same site. Hardware manager Mike Jones says of being local: "There are many benefits to designing our products and being based within the same market place. We understand the nature of the market well and can react quickly to new opportunities."

Jones points out that the need for designers to work closely with production is as strong as ever: "There is a tremendous amount of communication between the designers and the

Set top box maker TVonics discusses its evolving strategy for system test.

By Vanessa Knivett.

production engineers here, especially regarding test strategy. In terms of testing, control and measuring your production output, I believe there are considerable benefits for us from being able to manufacture in the UK. If there are issues that arise, they can be dealt with quickly and effectively."

Tighter integration has meant that electrical design is becoming more and more a system integration exercise, concentrating its efforts on providing added value, such as ease of use and low power consumption. Whilst ic integration has made certain design and production

Right: TVonics was behind the innovative 'Prism' set top box. The start up designed everything bar the packaging graphics.

tasks simpler, the feature sets of newer generation products are such that test time has increased as a percentage of the development cycle. Yet system test procedures have evolved too, which TVonics bears witness to.

TVonics' development test bench comprises all the equipment you would expect – including traditional oscilloscopes and logic analysers. One recent addition, however, has been XJTAG's development system, which is being used by the design facility to speed up debug and test of bga populated pcbs.

Says Jones: "Jtag allows us to drive the ic pins from the inside out without the need to download and execute special debug software into the system memory. We can drive the output pins, and read the status of the inputs. The XJTAG system makes use of this with its XJAnalyser package, which allows the real time values of the bga pins to be visualised.

"Whilst XJTAG doesn't have all of the capabilities of a logic analyser, for the majority of debugging and fault finding exercises, it's a very useful (albeit relatively low bandwidth) tool. We can

also drive non Jtag devices, such as memories and controllers, to perform comprehensive testing.

"Jtag is particularly useful at the board 'bring up' stage," he continued. "When you have a brand new board that's never been tried or powered on before. We can check soldering by using the read/write capability of Jtag and perform low level tests to give us confidence. It also allows us to download software into our flash memories – for example, bootloader code – which then allows the system to take advantages of higher speed interfaces to allow very fast programming of software for the production stage."

From a production perspective, tools like XJTAG have become a necessity. With most bga devices having some form of Jtag support, designers and production engineers are finding there are few better ways of getting to the pins.

immediate feedback – whether you have a resistor that's been soldered incorrectly, for example – is extremely powerful and enables us to perform more comprehensive testing. Once we've completed our validation testing, we can then produce a suite of tests that allow the production engineers to perform their job using tools like Jtag and RS232 communication."

The next phase

As a start up, the company experienced fast growth, but like most start ups, design staff and funds for test equipment were limited. Now with the Contact Group behind it, TVonics is embarking on a new generation of products featuring high definition capability as well as networking connectivity.

Jones says: "Buying ics from trusted sources means that you know all the video, audio, memory interfaces and so

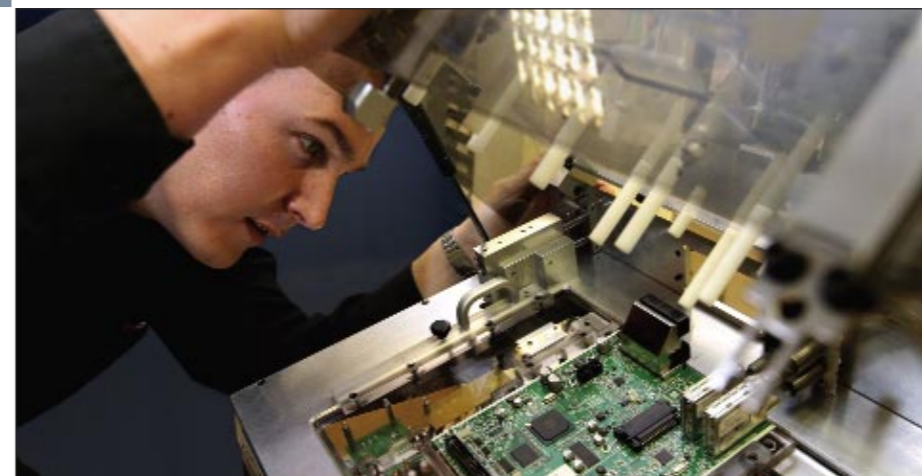
interconnects are soldered and behaving correctly. One issue is whether all the memories are connected up correctly and, in this case, Jtag can be used to generate walking bit patterns, test pull ups and pull downs. It can also be used to simulate internal communication interfaces such as i2s, spi and RS232 and to test peripherals such as tuners, modulators and AV switches."

To make the manufacturing process more slick, TVonics' validation includes testing the different components with a view to rationalising things like resistor values. It includes checkerboard tests and memory testing – the latter of which is now proving very difficult to access, according to Jones. "With DDR2 signals tending to be buried within multilayer boards, the small size of the package and its proximity to the main cpu, it is becoming impossible to introduce a scope – you are lucky if you can just get to a termination resistor."

Notably, the validation stage has been extended by the requirement to approve certain technologies at external test facilities (including HDMI and USB), which can add several weeks to the validation schedule. And, with a demand for integrating wireless technologies on the horizon, the situation isn't going to get any easier just yet.

Explains Jones: "We are seeing a big push from the market to integrate wireless networking, for example to provide video streaming around the home. Of course, broadcasting rf from your stb is normally precisely the thing that you don't want to do! It is a very difficult challenge, but something we will have to address."

Meanwhile, the industry is now at HDMI version 1.3 and talking about USB3.0. "These technologies feature interfaces running at several Gbit/s," he adds. "The challenge will be to keep quality high and to do so within budget. If you look at the equipment needed to test signal integrity for those signals, validation has the potential to become very expensive." ■



Notes Jones: "XJTAG uses the netlist from your circuit board design, it knows what your board looks like from a Jtag perspective. Therefore any termination resistors and link resistors are picked out by the tool at compilation stage and the designer can specify how the interconnects are used. So when you first apply the XJTAG tool to a circuit and test, it knows at default what all of the pull up and pull down resistors should be, what nets it should and shouldn't be able to see and what state it should be in. That

on have already been tested by the manufacturer at an ic level. So we would be looking to check they are working at a system level and that all

