

Is there life after asics?

The continuing rise of the fpga looks set to mark the end of the asic. Or does it? By **Mark Ellins**.

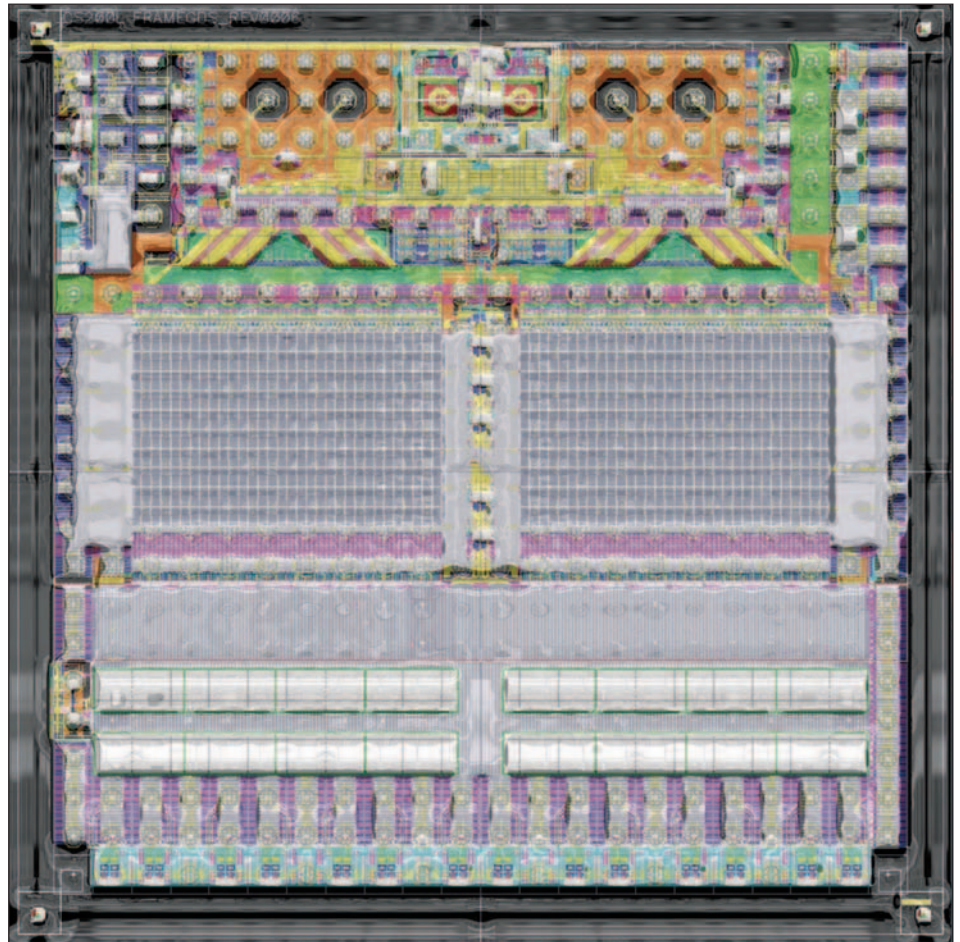
The development costs of complex system on chip devices (SoCs), together with the associated mask costs of each successive advanced technology node, have increased substantially over the last few years. Combining these factors with the continued enhancements in functionality and capability of alternative solutions such as fpgas or the remaining 'structured asic' solutions, gives rise to a valid question: is there a future for asic design?

Clearly, there are still areas where, assuming a custom solution is needed – for example to address gaps in the offerings of assp providers or to bolster product differentiation – the asic route is the only viable choice.

The characteristics of asics in providing the highest performance and/or optimal die size for a given solution are still valid today, despite the advances made by alternative options for custom design. We live in an analogue world and the need to interface to this world will always be there, regardless of how much data processing may be managed in the digital domain. The integration of high performance, low power analogue functionality is an area where asoc still represents by far the best – and sometimes the only – solution.

There has been a great deal of discussion in New Electronics, as well as other media, regarding the number of asic designs that are on offer today. Clearly, this number has and will continue to reduce due to the increased investment required. On the positive side, the very fact that the development costs are such a significant factor ensures that projects only get the go ahead when the business case can truly justify the use of an asic.

Experience shows the lifetime value of typical asic projects is rapidly increasing and that almost all of the developments carried out in recent years have entered volume production. The days of speculative asic development are gone forever.



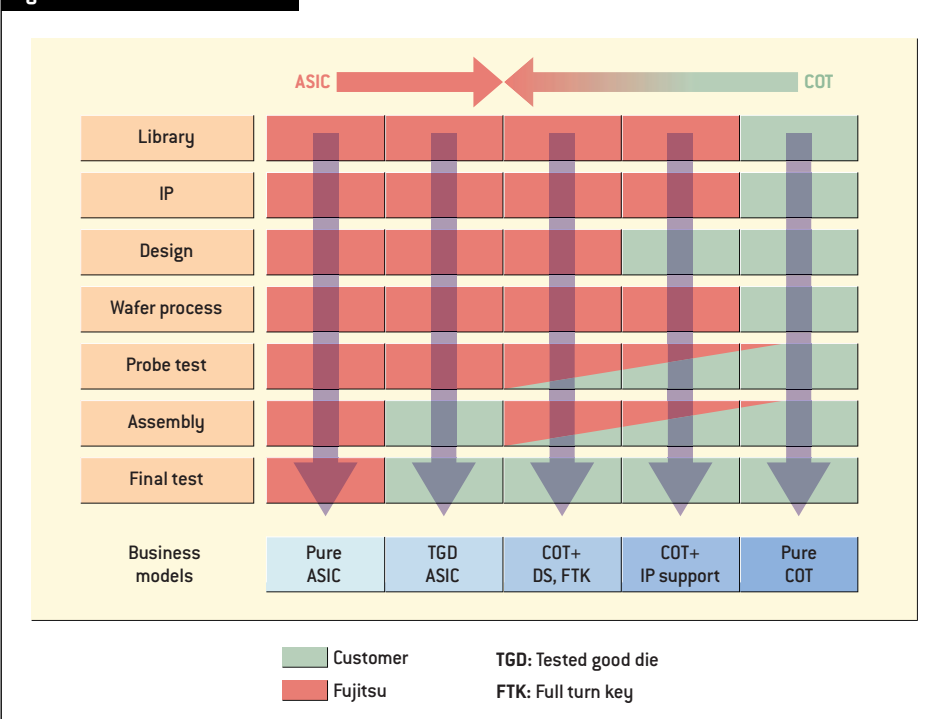
One additional critical question to ask is: what is an 'asic design'?

Traditionally, the word 'asic' implies that logical design is performed by the customer, followed by hand over of either a netlist or RTL to the asic provider, who then carries out physical implementation and provides fully tested packaged parts. However, there is increasingly a trend towards a breakdown of this traditional flow into its component parts, where customers look for the optimal combination of design services, IP,

technology and back end logistics.

Most current custom developments therefore fall somewhere between the conventional asic and foundry service models. Today, these engagements might well be termed 'ASIC Minus' or 'COT Plus', with the asic supplier adding value to its technology through provision of proven libraries and IP, as well as design services. Front end design and the back end of the production process are then often outsourced to third parties.

Fig 1: Flexible business models



Another interesting question is who are today's customers for asic solutions? And who will be tomorrow's? As the volumes required to justify the business case become higher, the logic of a single customer with its unique asic becomes more difficult to sustain. Instead, the model shifts more towards 'customised assps' or 'asic based assps' that can meet the needs of a number of end customers and, hence, achieve critical mass.

Two main choices can be envisaged in this new model. The first of these is an asic development with a lead partner, which can then be sold later to other end users. The initial customer is still able to get their desired optimised solution (perhaps with some small concessions to make the product more marketable) as well as a time to market advantage. The asic supplier offers preferred commercial conditions for the initial development, in return for the additional volumes that will be produced by later general market sales.

The second approach is to offer asic design services to the fabless semiconductor market. In many cases, fabless semiconductor companies lack all the resources to fully implement the design and manage the logistics chain, particularly in their ramp up stage. Partnering with an asic provider who can offer a secure, high

quality solution – as well taking responsibility for yield issues and the necessary logistics support – can be an excellent way to enter the market with low risk. A later migration to a more foundry like interface with that supplier can provide a seamless transition as volumes (and the capabilities of the fabless semiconductor company) increase

With a reducing number of design starts, but little or no change in the number of asic vendors offering their services, competition is intense. How then can asic suppliers differentiate themselves?

One area that can become a critical enabler to make asic solutions a credible alternative is IP. This is much more than simply offering the 'tick list' of standard cpu cores and interfaces that can be seen as a 'must have'. The asic provider needs to focus much more on enabling applications to become a reality through the provision of highly differentiated IP, which in turn radically tips the balance in favour of an asic approach.

An example from Fujitsu's experience is the continuing development of leading edge data conversion IP at the company's Mixed Signal competence centre in Maidenhead. Based on experience going back 20 years and on many successful mixed signal asic designs, Fujitsu has

recently announced the availability of a 56Gsample/s 8bit a/d converter macro, optimised for asic integration.

This critical IP, combined with the ability to manage multimillion gate asic designs in leading edge technologies, has enabled a new class of solutions for next generation 100Gbit/s dense wavelength division multiplexing optical communications. In this case, an integrated asic implementation is the only way to meet the extreme performance/power target for this application, as shown by the enthusiastic reception from the optical networking industry.

Of course, this is just one example from one specific market sector, but the same concept of success through differentiated IP can apply to many other potential applications – from broadband access to novel digital consumer applications.

In conclusion, despite the advances there have undoubtedly been in fpga technology over recent years and the efforts of others to develop a credible, 'structured' asic approach, there remains a clear space for solutions based on conventional asic technology. This is all the more so where performance and price are most critical.

In particular, the requirement for integration of high performance, low power analogue content is an area where asic often represents the only option.

However, in order to remain competitive in an increasingly hard fought market, the asic solutions provider needs to offer true added value, especially in terms of unique IP, which can enable asics to be a credible solution. Finally, the asic supplier also has to create an environment that can maximise the return on investment for its customers by offering flexible business models that can make custom developments more affordable and accessible.

Not all asic suppliers will be able to step up to meet these challenges, but for those that succeed, there will certainly be a life after asics.

Author profile:
Mark Ellins is director of Fujitsu Microelectronics Europe's ASIC/COT business unit.

ne For further information on any subject visit: www.newelectronics.co.uk