Low cost, miniaturisation and efficiency... almost mantra like, these words are used to focus the system designer's mind and to aid concentration as a preliminary to making the right choice of power supply specification. Buy cheap and you could live to regret your misplaced notion of saving pennies when field maintenance and repair ends up costing a fortune. Buy small and you'll need a cool head to deal with potential thermal management issues. Buy efficiency, however, and by the time you've finished reading this story, you could be waving goodbye to expensive energy bills.

The drive to improve efficiency cost effectively has become an enabler and manufacturers are keenly developing a broad range of complementary techniques to achieve efficiencies that continue to push the boundaries. Even at the giddy heights of 90% and beyond, every precious percentage gain is significant.

Powerstax' ceo Tim Worley believes the increased efficiencies come from both a reduction in unit size and the latest innovations in power supply topology. "There was a time when we thought that reaching 80% was the Holy Grail," he explained, "but chip design has improved, design topologies have been refined and switching frequencies have been optimised. All these things enable better efficiency from the power conversion stage. Yes, there is still some more efficiency we can squeeze out, but inevitably it's a case of diminishing returns."

PULS' managing director Harry Moore says many of the industries his company serves are critical, so it starts with the premise that all power supplies are governed by reliability. Moore feels that it's important for the customer to understand that, if they are installing a power supply into an expensive system, they don't select the cost over high reliability, citing the enormous maintenance cost of or replacing a power supply on a North Sea oil rig.

"Highest efficiency ensures the power supply runs at optimum reliability," said Moore. "For example, PULS' latest three phase unit is more than 96% efficient and therefore only 3% of the input is produced as heat. Heat kills electronics, so increased efficiency also helps the system."

Worley agrees the continued application of heat invariably kills most components over time and that higher efficiency has a positive spin off in terms of improved reliability for the system designer. "We're seeing an increasing demand for power designs that won't draw any power when in standby mode or quiescent state," he affirmed. "Some customers don't want the standby mode to draw quiescent currents of anything more than 10mA, so we're using the latest circuitry techniques to accommodate these demands. It's a positive step, because it consumes less power, less waste in terms of heat and it also assists reliability."

Along with efficiency gains, environmental issues are close to Worley's heart. "Powerstax has been conscious of this for a long time and our business is founded on the basis of high efficiency power conversion. Everything we offer to the market comes from this perspective and in a sense the 'Green Lobby' is catching on fast. We're more aware of programmes like Energy Star and the 80-Plus power supply standard campaign led..."
by American electric utilities to get system builders to use more efficient power supplies as they help form an important part of energy conservation."

**Market requirements**

XP Power’s industry director, communications, Steve Willis (pictured above right), stresses the importance of manufacturers knowing where to position a new power supply design in the marketplace and whether the primary goal is to satisfy a demand for cost, size or efficiency – otherwise the product satisfies no one.

“There are a number of things we can do to squeeze the last few drops of efficiency out of a power supply,” Willis began. “We’re driven by our product marketing specification and there are a number of reasons for this. For example, do we consider convection cooled or fan cooled power supplies? To a point, efficiency becomes less of an issue if you have the freedom of using fan cooling, whereas if you specify a convection cooled solution and really want to push the boundaries in terms of module size, then efficiency becomes more important.

“We can improve efficiency further and one of the aspects to consider in defining these boundaries is the bottom end, low line efficiency operation. System designers must understand that efficiency drives how much waste heat they need to remove from the unit. This dictates what topology the designer might need to achieve the efficiency required in a certain unit size. But there’s only so much waste heat you can remove from a certain size module – regardless of whether you use convection cooling or fan cooling. The more power you put into a smaller space, the higher efficiency you’ll need. Otherwise you’ll end up running too hot.”

Moore (left) is convinced that power issues of the future will revolve around efficiency. “Without doubt, a 1% increase in efficiency is still a significant decrease in energy usage,” he explained. “We design units based on their efficiencies, so they are as small as they can be to ensure that they can remove heat without fans. We believe the future lies in convection cooling. Fans are the most unreliable part of a system as they can blow dust and contaminants around which can cause short circuits and reduce lifetime expectancy.”

Whether it is low cost, size or efficiency, Worley feels the easier it is for a power supply to be incorporated into a system designer’s product, the more likely they’re going to want to use it. “We’re sitting at 92 to 93% efficiency and we’re still striving to squeeze that extra percent,” he concluded. “What will surely help power utility companies is when power standby mode innovations filter through into mass market consumer products that draw more than they need to, such as televisions and household appliances.”

PULS recently launched its first digitally controlled unit, which offers the flexibility of monitoring its own heatsink temperature, warning you automatically if it starts to overheat or fail. Depending on the application, power supply performance can be changed without altering the hardware. Now, it is the software that understands how the power supply is being used. The cost of this technology is falling and manufacturers are close to adding these features to relatively inexpensive modules.

"Increased efficiencies come from a reduction in unit size and innovations in power supply topology."

Tim Worley, **Powerstax**

**New Electronics** www.newelectronics.co.uk 26 June 2007