



WWW.NEWELECTRONICS.CO.UK

VOLUME 55 / ISSUE 11
NOVEMBER 2022

16

LONG READ

How phased array radar systems are being used to detect tornadoes

25

DESIGN TIPS

Some design tips to help you get ahead of supply chain issues

40

COMMUNICATIONS

The convergence of 5G, the Cloud and satellite communications examined

new electronics



12

LIGHTING + BUILDING

THE LIGHTING + BUILDING EXHIBITION PROVIDED AN OPPORTUNITY TO EXAMINE SOME KEY SECTOR TRENDS

SELECTION STARTS HERE



Find it at [digikey.co.uk](https://www.digikey.co.uk)

“ROUTINELY DESIGNING IN FLEXIBILITY WITHIN A DESIGN IS CERTAINLY BENEFICIAL, NOT LEAST BECAUSE IT PROVIDES THE POTENTIAL TO REDUCE COMPONENT COST”

DIFFICULTIES BE DAMNED!

Some design tips that will help you to get ahead of ongoing supply chain issues. By **PAUL BEARPARK**

The last 18 months have been extraordinary for the electronics industry. Supply chain issues have dominated everything. For those of us who have been in the industry for a long time we have seen supply issues in the past but never anything remotely on this scale

As design engineers we have grown very accustomed to being able to design in the best part for the job. So, it's been quite a shock to find that your favourite supplier of microcontrollers is estimating that they won't have any availability for the next 96 weeks.

Initially, it was problems with supply of microcontrollers that made itself felt, and then many other components became infected with the 'long lead-time' virus.

Not only has availability been an issue but prices have also been volatile. We've seen significant price changes even from day to day. On a monthly basis, prices have been seen to change by a factor of ten. This has compounded the challenges of component selection – not only are there fewer choices but it's difficult to be certain about the cost of the bill of materials.

The automotive industry is the one that we seem to hear about the most. Its woes are characterised as being self-inflicted because it cancelled orders with suppliers

when lockdowns hammered sales of vehicles. But when the economy opened up again it tried to reinstate those orders only to discover the stock had been reallocated. However, all parts of the electronics sector have been impacted to a greater or lesser extent by the semiconductor industry's inability to respond to rapidly changing demand.

For electronics design engineers the supply chain issues have added an additional burden to the challenge of meeting demanding specifications in a short period of time. Not only might a design have to be achieved using components which aren't the most preferred, but it's been necessary to assess whether the selected components will continue to be available. Additionally, there's been significant effort expended to keep existing products in production through redesigns using alternative components where this has been possible.

ADAPT TO SURVIVE

During this period, we have had to adapt and figure out new ways of working. We may even have had to learn some new tools in order to use a different supplier's components to the ones we are used to. This is especially the case for microcontrollers where completely new toolchains may

need to be learned.

We've become used to confirming the use of a part once we have ordered and received sufficient quantities for first prototypes, subsequent prototypes and even pre-production. We've also become much more used to working more closely with purchasing departments at an earlier stage in the development process so that they can start securing stock for production. In our situation where most of our designs are developed by contract electronic manufacturers (CEMs) those relationships have had to be put in place much earlier than usual so that they can start securing supplies.

Occasionally, parts that we thought were in stock in sufficient volume turn out to have purchase restrictions on them so that it's only possible to buy a fraction of the advertised stock.

We've started creating designs which have multiple overlapping PCB footprints so that we can quickly change production to use alternative parts in the event that the preferred one becomes unavailable. Alternatively, we have created surface mount modules with a microcontroller or other component on it that can be more easily swapped out than modifying the layout of the main PCB.

Often, we've bought devices much sooner and in larger quantities than we would have done before. We appreciate that this could be deemed to be exacerbating the supply problem but usually the volumes are insignificant compared with the eventual production volume. Hence, we don't feel that we're rushing into the supermarket and buying everything on the shelves.

We have frequently discovered that there is only a





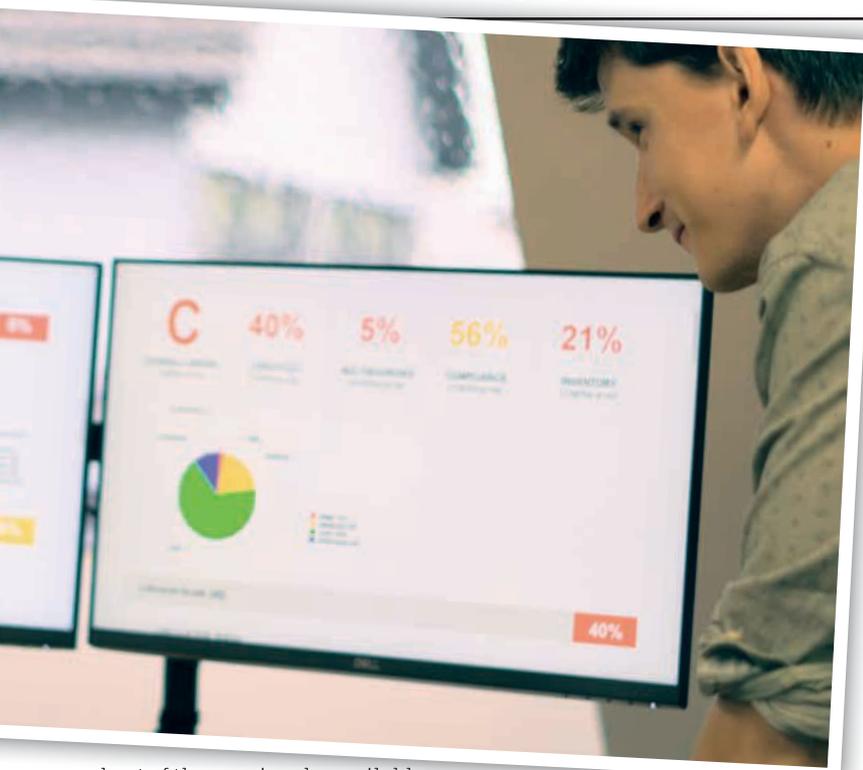
AUTHOR DETAILS

Paul Bearpark
Head of electronics and
software at 42 Technology

DID YOU KNOW?

96

The number of weeks a supplier was quoting for MCU availability



subset of the previously available variants of a device. In particular, it's often only microcontrollers with the smaller memory sizes that are available. Sometimes this can result in a significant re-think about the product implementation and even the features that may be supported. Occasionally, there might be a straightforward way to reduce memory usage.

In the past, purchasing professionals have always requested that second sources are identified, and it's been seen as a 'nice to have'. But it's now a much more important consideration during the design. For example, it's preferable to use op-amps which have 'standard' pinouts than ones that are unique.

TIPS FOR SURVIVAL

If it feels like an uphill struggle trying to pinpoint the components you can use in your design, then our general guidelines would be to design for increased flexibility, keep track of market trends, and buy now. But here are more specific suggestions to consider:

BOM/PROCUREMENT TIPS:

- 1 Ideally, choose components with pin-compatible alternatives where at all possible.
- 2 As soon as possible (even before the BOM is finalised) identify the critical components, check their recent availability (using websites such as Octopart), and buy enough stock to cover you for the manufacturing lead time.
- 3 Use tools like Silicon Expert to assess the 'health' of your BOM with regard to lifecycle, multi-sourcing, compliance, stock, etc.
- 4 If you're thinking about using a component, but haven't necessarily confirmed its use, buy it anyway!
- 5 If necessary, consider buying from non-authorized distributors but be aware of the risks.
- 6 If there is no more stock, look for alternative versions of essentially the same thing – different package or packaging formats (tape and reel, loose, etc), differently plated pins, automotive grade, etc.

PCB-DESIGN TIPS:

- 1 If space isn't tight, then design the board with alternative components as 'do-not-fit'. Only the BOM changes when the components change rather than requiring a PCB redesign.
- 2 If space is tight, then leave space on the board around your preferred component, in case the biggest alternative component is needed. The board design will need to be redesigned, but only by moving the track in this local area.
- 3 In the most space-constrained circumstances, aim to provide overlapping footprints if possible.
- 4 Put critical components on daughter boards or modules, so only the daughter board changes for alternative components.

PRODUCTION STRATEGY TIPS:

- 1 Start discussing plans with purchasing departments as soon as possible.
- 2 Issue BOMs early so that they can start planning for production and securing supply.
- 3 Understand the project and production schedules from the outset so that it's clear who will be responsible for purchasing what and when. It's important to know when the builds move from being prototypes under design department control to the responsibility of the manufacturer.

BEING PREPARED

There are suggestions that some of the supply chain issues may be easing now, possibly even leading to a glut, but there's no doubt some of the lessons learned during this difficult period should continue to be applied in our designs.

Routinely designing in flexibility within a design is certainly beneficial, not least because it provides the potential to reduce component cost. But you also don't know when the next factory or warehouse fire, earthquake, virus, conflict or civil unrest might be disrupting the supply of your product's key components. So, be prepared.. **NE**

