



*Zuken's software solution  
for electrical wiring,  
control systems and fluid  
engineering.*



***BCA Leisure*** stays responsive and competitive using E<sup>3</sup>.series to design and manufacture cable harnesses for caravans and motorhomes

*"E<sup>3</sup>.series is much more than a single tool for us. Everything we do relies on us having accurate, live data – and that's what E<sup>3</sup>.series feeds into virtually all of our processes."*

Martin Price,  
BCA Leisure,  
Purchasing and IT Director



## **BCA Leisure** stays responsive and competitive using E<sup>3</sup>.series to design and manufacture cable harnesses for caravans and motorhomes

Established in 1981, BCA Leisure, part of the BCA Group, designs and manufactures mixed power cable harnesses for almost every UK-based OEM of caravans and motorhomes. The company has been using E<sup>3</sup>.series for a number of years and recently started using E<sup>3</sup>.cable, part of Zuken's E<sup>3</sup>.series suite, which is now heavily relied upon during the development of 100+ different prototype harnesses each year. This is followed by provision of detailed production drawings to the shop floor.

Through close integration with the company's ERP and by sharing live data, E<sup>3</sup>.series is enabling BCA Leisure to remain extremely competitive. This despite customers all requiring harnesses around the same time of year, and a supply chain complicated by long lead-time items, material shortages and fluctuating currencies.

As you would expect for the UK, with its temperate climate, the country's leisure industry is extremely seasonal. Virtually all manufacturers launch their next season models each October at the Motorhomes and Caravan Show, and at least 10% of annual sales will come from orders taken during the event. The models on show each October are production and prototype models, for which BCA Leisure will have supplied more than 100 different prototype cable harnesses to its customer base.

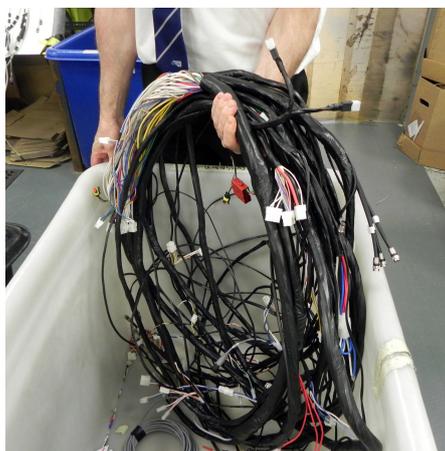


Figure 1: Above, a typical wiring harness for a caravan. It will contain both earthed mains AC power and DC power cables as separate harnesses.

Caravan and motorhome OEMs build their prototypes during the spring and summer preceding the show, and BCA Leisure typically spends most of the first half of each calendar year designing and testing prototype harnesses.

Martin Price, BCA Leisure's Purchasing and IT Director, comments: "We typically receive instructions from our customers in Q1, once they have completed their initial designs for floor plans and the approximate locations of equipment connecting to 240VAC or 12VDC power, or both. There are also all the switches and power sockets to consider."

The general trend is for the wire count to increase year-on-year in response to new features being added. For instance, some caravans and motorhomes are being fitted with multiple TV points. Price notes: "Some models are pre-fitted with a high-current-carrying power harness ready for the aftersales fitting of motor-movers.

### Results:

- Design tasks reduced from days to minutes, along with minimized risk of errors.
- Time and money saved helps maintain profitability despite varying exchange rates and volatile material costs.
- Improved visibility of material requirements helps planning for long lead-time component ordering.
- Swift and painless switching to E<sup>3</sup>.series: drawings look the same but are now backed up by real data.



### BCA Leisure

BCA Leisure produces wiring systems and electrical components for the caravan and motor home industry.

E<sup>3</sup>.series is a Windows-based, scalable, easy-to-learn system for the design of wiring and control systems, hydraulics and pneumatics. Its object-oriented system architecture, built on a central database, ensures the continuous synchronization of all engineering stages.



Solar panels for battery charging are becoming popular too, as are reverse-aid cameras. Indeed, the leisure industry is very much driven by must-have accessories and gadgets, many of which impact the caravan or motorhomes harness."

### Harness responsibility

Unlike other Contract Electronics Manufacture (CEM) scenarios, where the manufacturer would typically receive a detailed design and a Bill of Materials (BOM), cable manufacturers are frequently responsible for a fair amount of the development work as well. In BCA Leisure's case, most of its customers mark-up the cable plan drawings for the current season to indicate their requirements for the next one. These mark-ups are often accompanied by an indication of the equipment the caravan or motorhome will carry; and it is BCA Leisure's responsibility to perform an Electrical Load Analysis (ELA) as part of its development work.

"Prototype harnesses then need to be designed, manufactured, tested and supplied to the caravan and motorhome OEMs as soon as possible," continues Price. "We then await feedback from them regarding any changes that need to be made before we go into volume production.

The feedback is essential, but it's often subject to delays - which really puts the pressure on if changes are necessary. And some of our connectors have a 26-week lead-time, which adds extra pressure."

Before using Zuken's E<sup>3</sup>.series, BCA Leisure had been using a standalone, well-known CAD package; just for electrical drawings. Its ERP managed, and continues to manage, stock, BOMs, accounts, work in progress, dispatch and purchasing. Price recalls: "Though clearly a crucial activity within our business, electrical design was effectively isolated from all production and commercial activities."

This gave rise to a variety of problems, most of which related to the time taken to manually re-enter data - which also presented an opportunity for errors to be made. There was limited version control over drawings or other publications (such as BOMs) and there was poor visibility over material requirements for any given harness. Also, if changes were made to an existing harness - to fix a problem found in test (see figure 2), for example - BCA Leisure was heavily reliant on personnel remembering to go back into the schematic and reflect the changes made. Price: "If they forgot and we received a repeat order we'd end making the harness exactly as before, test finding the same fault and the same fix being applied."

### Roll-out

When they initially selected their new digital electrical design system, BCA Leisure worked closely with its ERP vendor. They helped produce a shortlist of three products to be benchmarked. Price recalls: "Of the three systems, Zuken's E<sup>3</sup>.series, which was presented by High Peak Systems, was the best by far."

Shortly after its purchase and a training period it became clear that the electrical design system should be linked directly with BCA Leisure's ERP system. Working together, BCA Leisure, its ERP system's vendor and High Peak Systems established a rule set to govern what information, and in what format, should pass between each of the systems.



*Figure 2: Every cable harness is fully tested. Before switching to E<sup>3</sup>.series, which is tightly integrated with BCA Leisure's ERP, repeat faults were being found as a result of applied fixes not being back annotated to the schematic. Now, strict version control is in place - and unless the schematic is correct the harness cannot be made.*

Price says: "This required considerable upfront effort, because you also need to police against ambiguous or misleading information being transferred between systems, but it has certainly paid dividends in the long-run."

For the roll-out, it was essential that switching to a new electrical design package did not disrupt shop floor activities. In this respect, High Peak Systems provided invaluable support and helped ensure the drawings used by production looked as close as possible to the ones with which they were familiar.

"And they did," adds Price, "but we had the peace of mind that these look-alike drawings were the result of a tightly integrated database running seamlessly in the background."

"Though at the time it felt like we were making a leap of faith, possibly because we were doing so much fire-fighting and the last thing people wanted was change, the adoption and integration of E<sup>3</sup>.series could not have gone better," says Price.

It was business as usual as far as assembly (figure 4) and test were concerned but with the added confidence that the schematic, the bill of materials, and all other associated documentation was in perfect sync. In addition, data such as drawing rev numbers now feeds through the ERP all the way through to shipment notes (see figure 5).

Price recalls: "During the switchover to E<sup>3</sup>.series most questions came from our commercial department. They were seeing clarification of some of the costs for the first time!"

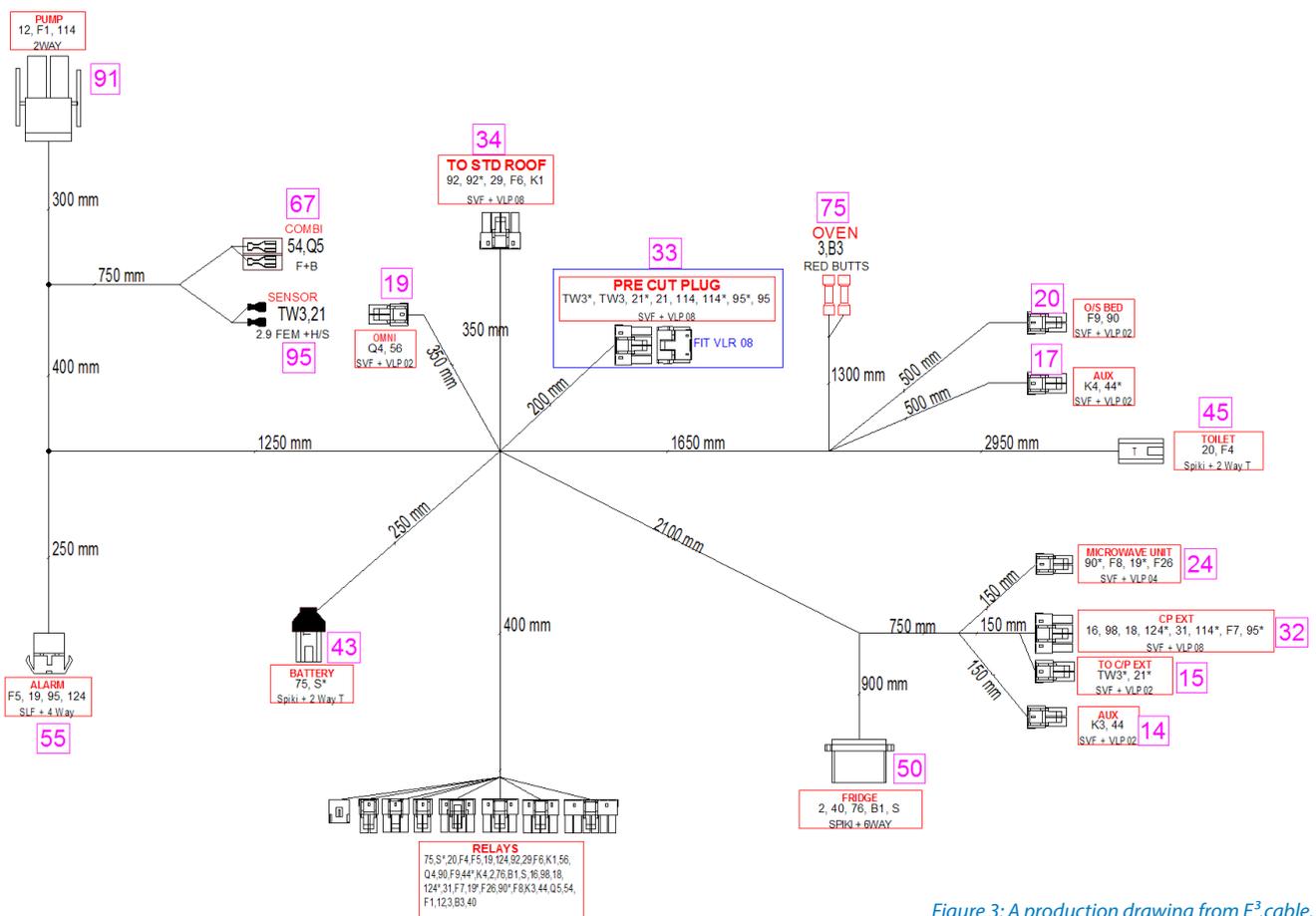
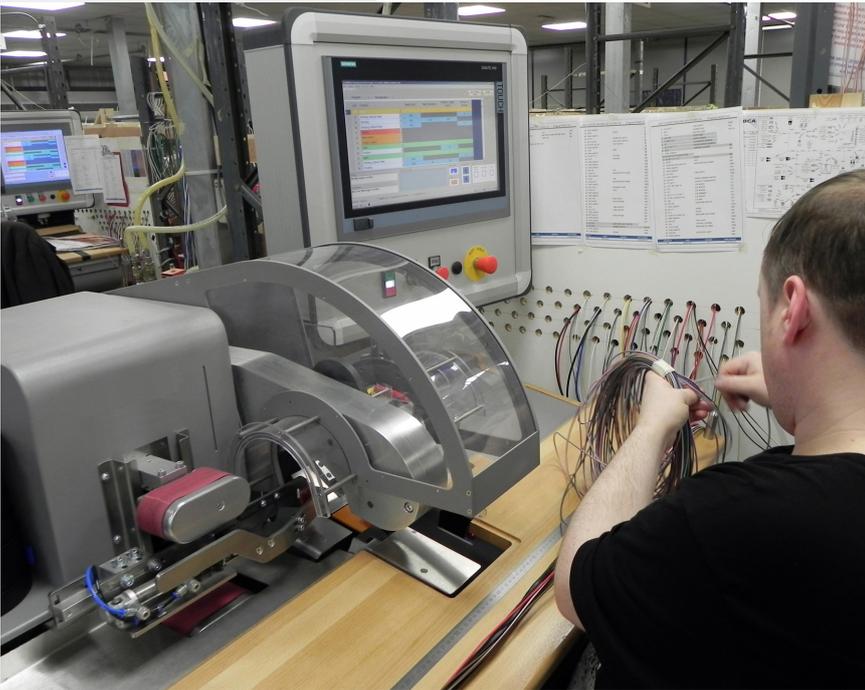


Figure 3: A production drawing from E<sup>3</sup>.cable.



*Figure 4: Engineering's switch to E<sup>3</sup>.series had little if any effect on assembly. The drawings looked exactly the same as before but are now unequivocally linked to schematics.*

## Futureproofing

The use of E<sup>3</sup>.series, and the CAD tool's tight integration with BCA Leisure's ERP (and by extension its business infrastructure) is keeping the company lean and responsive. Tasks that previously took days, and were dependent on personnel remembering to manually make changes, now take minutes and the risk of errors is minimised. In addition, sight of, and therefore control over, the company's cost centres has made a big difference and it is futureproofing the business.

Price concludes: "We're importing components from Japan and the US, so have to be mindful of exchange rates. Also, copper price volatility will certainly affect wire costs – irrespective of where we source from. In fact, it's fair to say had we not switched to E<sup>3</sup>.series and been able to improve our operational efficiencies I don't think we'd feel as confident about the future. As it is we're able to better accommodate changes in the supply chain and provide a fast and cost-effective service for our customers."



*Figure 5: Ready for shipment, the harnesses are accompanied by delivery notes that carry data generated by E<sup>3</sup>.cable in order to provide complete traceability.*