SUCCESS STORY

ZUKEN®

E3 series®

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

Emergency One controls wire harness design complexity and slashes delivery lead times with standardized design and manufacturing process

Emergency one

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Graeme Shields
Design Manager, Emergency One

Emergency One controls wire harness design complexity and slashes delivery lead times with standardized design and manufacturing process

Specialist fire rescue and emergency vehicle manufacturer, Emergency One UK Ltd, uses E³.series software for its electrical harness design. This has enabled the company to produce wire harnesses to standardize the design and manufacturing process reaping, cost savings and reliability benefits, while also delivering flexibility through modular based customization.

The Complexity of a Fire Engine

Compared to other emergency services vehicles, a fire engine is one of the most advanced vehicles in its class. A vehicle of this nature requires control systems to monitor and control everything from engine speed, electronically controlled pumps, down to whether or not the doors are open, seatbelts are fastened and ladders stowed in place. Emergency One's standard wiring installation uses two controllers, each with a 154 way connector. Managing this much wiring without an advanced CAD system is nearly impossible, laden with errors and requires extensive rework, considering the number of wires for each project (an Emergency One wiring installation typically has more than 1,000 wires).

Putting out the Fire

The adoption of E³.series has helped the company alleviate the bottleneck typically taking place at the time of electrical wiring installation, which was then causing a delay in the completion of vehicles. There were three main reasons for the bottleneck: the extent of customization involved in each vehicle; not being able to test and verify the electrical system on screen at the design phase; and a limited number of qualified electricians to perform the installations. This called for a solution that would give them the power to identify errors early in the product development process, and deliver high-quality detailed documentation that would reduce the requirement for specialized vehicle installation technicians.

"When I first joined Emergency One, we used a generic CAD system and documenting a design was a nightmare. The previous system made us rely heavily on the design work done on the workshop floor. With a standardized wiring set-up this means you don't require such a highly skilled workforce, as this is all now done within E³.series," explained Graeme Shields, Design Manager at Emergency One.

One of the many fire engines designed using E³.series by the team at Emergency One

Results

- Standardized design and manufacturing process resulted in cost savings and reliability benefits, while also delivering flexibility through modular-based customization.
- Bottlenecks were removed in electrical wiring installation by implementing test and verification within E³.series at the design stage.
- By delivering more detailed information to the wire harness manufacturer, lead times were slashed for delivery and additional time savings mean vehicles get to market faster.

Emergency One

Emergency One (UK) Limited is a Scotland based manufacturer of firefighting equipment and related services. The company is committed to delivering the highest in product quality, durability, reliability, safety, innovation, service, training and after-sales support.

Emergency One provides a comprehensive catalogue of products ranging from fire vehicles, special vehicles, rescue equipment and components, such as electronic pump controls, control monitors, CAN bus and electrical systems.

E³.series is Zuken's software solution for electrical wiring, control systems and fluid engineering.

E³.series from Zuken is a Windows-based, scalable, easy-to-learn system for the design of wiring and control systems, hydraulics and pneumatics. The out-of-the-box solution includes schematic (for circuit and fluid diagrams), cable (for advanced electrical and fluid design), panel (for cabinet and panel layout), and formboard (for 1:1 wiring harness manufacturing drawings). Integrated with MCAD, E³.series is a complete design engineering solution from concept through physical realization and manufacturing output.

"For each new design/build, we had to create a brand new design project from scratch. We needed a standardized system that would allow us to create the designs and to deliver data for harness manufacture. E³.series does all this and more."

With their old method of onboard electrical integration, the electrical engineers drove the process, installing the wiring on the workshop floor; they would wire everything their own way, which wasn't always the best way. Since introducing E³.series, they have changed their processes dramatically. The electrical engineers now refer to E³.cable, data from E³.formboard and photographs. The data flow has changed significantly—the information coming from the design side has improved efficiency in wire harness installation radically. Where previously very advanced niche skills were required for electrical installation, now the thorough documentation set means that Emergency One can utilize people with a more generic electrical skill base.

Wiring within a Fire Engine

More recently, the body harness has been split into three, one for the pump-based section of the harness and another for the two header panels; aiding modular assembly and repair. The object orientated database which sits at the core of E³.series enabled Graeme to easily split the harness drawings and easily amend the schematics to make this a simple and straightforward update to the designs.

Emergency One has introduced a parameterized program that allows them to create harness templates that only need to be tweaked for each fire engine. Now Graeme simply turns features on and off without having to change the wiring. What was a time-consuming, complete customization process before, is now a platform design approach with custom-made sections. Although each vehicle is customized, about 90 percent of the wiring is the same.

Having common schematics across builds is important for quality and time savings at both the design and manufacture stages, and for the lifelong maintenance of the vehicle. By delivering more detailed information to the wire harness manufacturer, they have also been able to slash lead times for delivery, and achieve other time savings that helps Emergency One get their products to market faster.

Fire Brigades' Demands

One of the most significant reasons why Graeme Shields at Emergency One chose E³.series was the excellent schematic creation abilities.

"Due to the amount of electrical complexity involved in fire engines, brigades are now demanding that a good electrical schematic is supplied upon delivery of the vehicle. E³.series' ability to generate top-quality, detailed schematics has been exceptionally beneficial for us. Customers have already noticed the improvements in electrical quality; they even stated that these new vehicles are especially good – we take that as a great compliment. In fact, we've had only minimal harness problems, which is particularly good for a new system.

The detailed schematic reduces the time we spend answering customer questions as a result of the quality of documentation, which has allowed us to reduce costs associated with customer support. We also aniticpate reduced downtime involved in repairs due to the superior quality of the schematics."

The E³.series Set-up

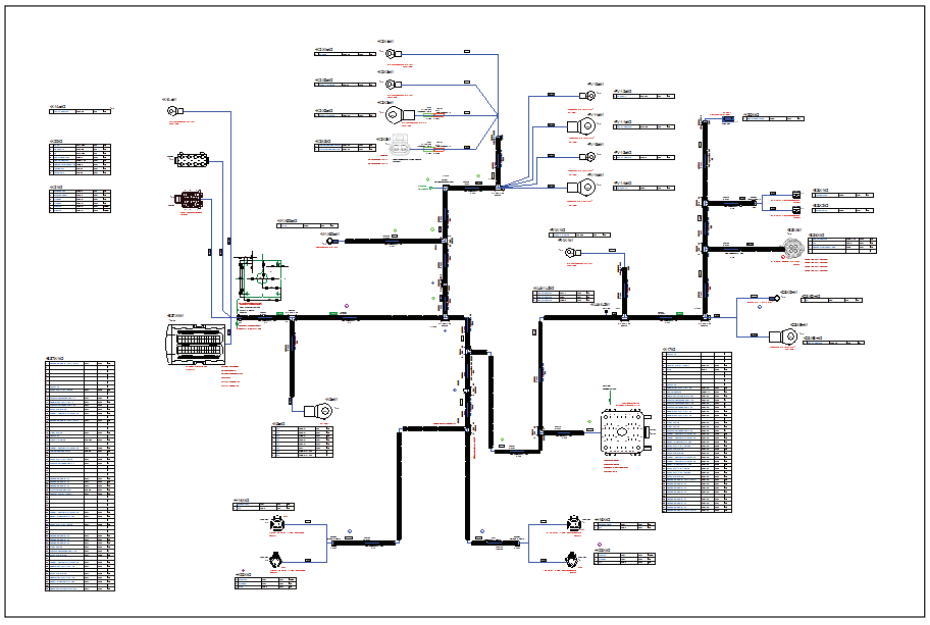
E³.series is a Windows® based solution for the design and documentation of complex electrical and electronic systems. Emergency One is using E³.cable for the wiring, cable and wire harness creation, and E³.formboard for the creation of nailboard documentation. E³.formboard is an important part of the solution package. The add-on allows them to send professional documentation to their harness manufacturers and is an excellent tool for troubleshooting. The documentation output from E³.series has also enabled Emergency One to provide fully detailed schematics in the owner's manual, to support the total lifetime of the vehicle.

E³.series is available worldwide either directly from Zuken or from third-party resellers. In this case, Emergency One turned to High Peak Systems for its purchase and ongoing support of E³.series.

A Solid Engineering Base for the Future

Over recent years many fire engine manufacturers have gone out of business because they have failed to keep up with the growing demand for electrical control and integration onboard the vehicle. Emergency One identified this requirement and has worked to grow its design and manufacturing competencies in this area. Emergency One has always aimed to be at the forefront of electronic appliance control and also pioneered electronic pump control. At the heart of pulling all this technology together to deliver high-quality reliable vehicles is E³.series.

"We have a very sophisticated and all-encompassing system with an advanced control system. With E³.series I am in control of this complexity and it has allowed me to create designs logically. It is the ultimate way to take what I have in my head and put it on paper. When working with a harness supplier, I can point out where things are wrong. It is fantastic to have the knowledge that E³.series can do everything I want. In the same way that our vehicles are highly customizable, so is the functionality within E³.series that allows us to realize this"



With E³.formboard's integration with E³.cable, the logical interconnection data defined in E³.cable is used directly in E³.formboard.

E³.cable

Documentation and design of cables and harnesses

E³.cable is a superset of E³.schematic and is used for designing and documenting cable plans and harness layouts. Individual conductors are combined together in the design to form new cables or harnesses. Shielding and twisted-pair structures can also be added to the cables and automatically shown in the schematic.

E³.formboard

Preparation of documentation for manufacturing

E³.formboard is fully integrated with E³.cable. Together they provide a complete solution for designing cable harnesses for manufacture. Harness drawings may be scaled to any size and multiple harnesses can exist in the same project. Automatic functionality simplifies the placement, arrangement and dimensioning of the segments.