ZUKEN®

E3.series®

Mil/Aero Edition
Aerospace

Wire harness and control system design and documentation for the aerospace industry

Aerospace

Introduction

Electrical design projects in the aerospace industry are often large and highly complex, involving numerous design iterations. They also require strict access control.

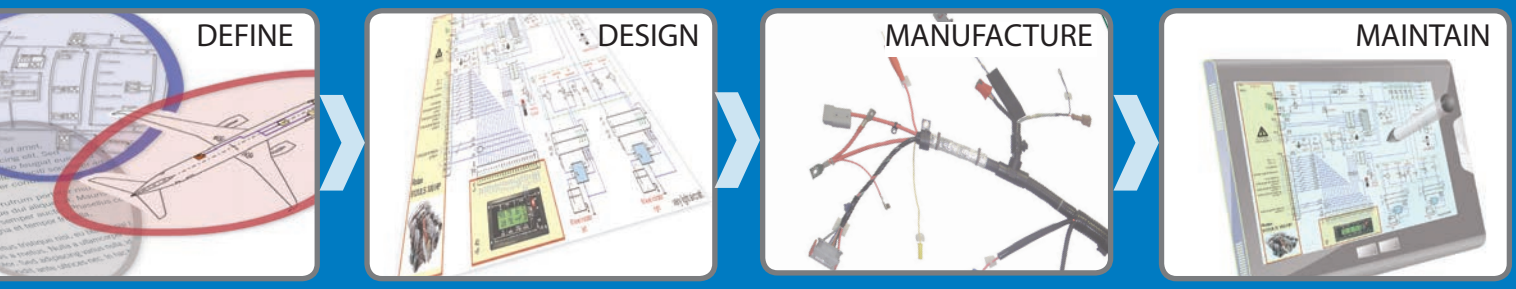
There is now a swing towards COTS (commercial off the shelf) part and equipment sourcing which has been driven by the global squeezing of budgets and the improvement and availability of quality, off-the-shelf equipment. Additionally, the continual rise of fuel prices is driving manufacturers to find ways of designing aircraft that are smaller, lighter, faster and cheaper. Small commercial jets, spacecraft, custom aircraft and helicopters form a buoyant segment within this innovation-led industry.

Recent trends show a high degree of collaboration with external suppliers, contracts requiring faster time-to-production and upfront cost reduction. These projects require electrical design data to be tightly managed and integrated smoothly into the overall program.

E^3.series is used in numerous aerospace companies for documenting and detailing electrical systems, wire harnesses and fluid designs. Its flexibility supports the whole design process, from definition and design through manufacturing and maintenance and its unique architecture ensures that all stages are fully synchronized.

Common challenges

- Highly regulated industry
- Multiple design reviews
- Smarter, faster, lighter, economical designs
- Introducing COTS for custom design
- Large project designs
- Supply chain integration
- Full digital mockups
- Design communication



Define

Parts management

In an industry driven by regulations, it is imperative that parts used within the design are controlled and managed. E3.series comes with its own parts library, has its own library and data management system and has links to all major PLM systems.

Electrically aware parts library

Intelligent parts libraries help drive the design with automatic part selection and real-time design rule checks to prevent errors.

Centralized parts library

Centralized parts library enables customers to control which parts are used in designs, avoid duplication, and ensure consistent quality. With the library stored in Oracle or Microsoft SQL and using standard replication tools, companies with multiple sites ensure parts libraries are consistent between locations.

Upfront planning with functional design

Using E3.Functional Design, systems engineers create functional blocks at an architectural level. These blocks represent equipment or locations, ports can be freely defined on the blocks and connections are made between them. As the design progresses the content and behavior of the blocks develops. E3.Functional Design also allows designers to create a physical and logical representation of their designs while maintaining an intelligent link between the two. Functional blocks can be referenced in E3.topology for harness creation.

Design

Intelligent block designs

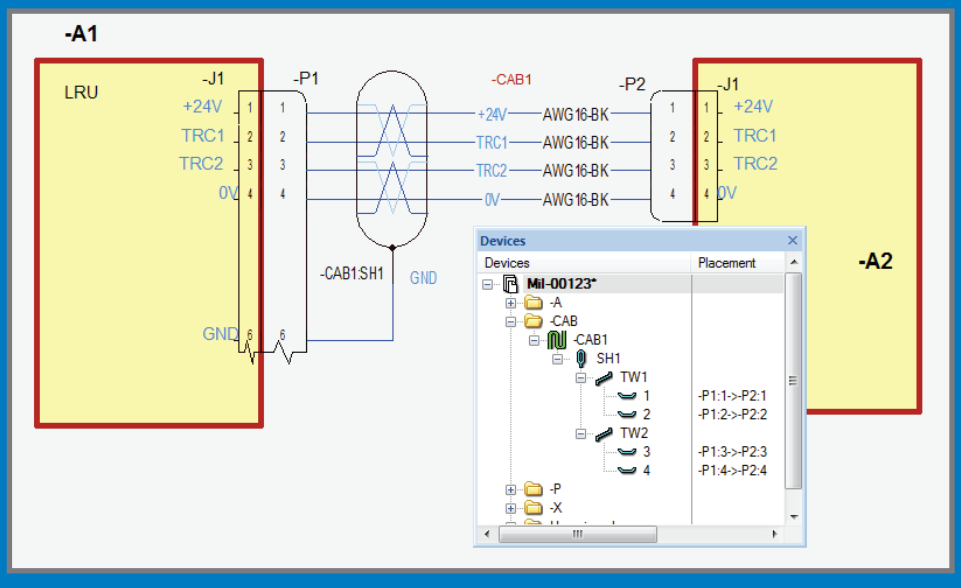
To cater for increased use of line replacement units (LRUs) or COTS parts in the aerospace industry, E3.series provides special block functionality. Blocks can be predefined or created dynamically on the fly. They represent components, black boxes such as PCBs, or with the use of hierarchy, entire systems. For LRUs or PCBs (supplied externally or developed in-house) blocks can be dynamically controlled by PCB applications such as CR-5000, where changes to signal and connector information will automatically update on the block.

Scalable solution

For companies looking to combine upfront planning with schematic and initial harness layouts, E3.series offers a scalable solution. For smaller projects, E3.series is available in a standalone, single-user version; but when project scale or complexity increases, E3.enterprise offers multi-user access to the same projects. This allows multiple engineers to work simultaneously in the same design any changes made by individual designers are immediately seen by all other users. E3.enterprise also comes with access control and lifecycle options.

MCAD routing

E3.3D Routing Bridge enables companies to integrate their electrical harness designs with all major MCAD solutions. Electrical harness details such as connectors, terminals, splices and netlists are transferred to the MCAD system, where harness engineers route the cables in the 3D mechanical space. The length and structure of the harness is transferred back into E3.series where the final details are added for manufacturing.



E3.series is developed by electrical engineers for electrical engineers. Core to its philosophy is its object-oriented architecture.

Design

Variants and options

For companies whose designs contain variants and options, E^3.series allows users to combine all variants and options into a single project, then configure a complete design that includes all documentation, manufacturing outputs and bills of materials. For more complex requirements, the E^3.series packages and configurations utility allows designers to configure their options via a configuration interface.

Harness optimization with E^3.topology

E^3.topology takes designs from the logical world into the physical. Topology sheets created at any scale can be added to the overall E^3.series project. Sheets can represent the physical design space, such as the chassis or fuselage, and installation spaces such as control panels or lighting units are added to the sheets. Connections between these installation spaces represent harness routes.

Alternate views of logical devices held in the same project are simply placed into the relevant installation spaces.

As this process continues, signal logic and wiring information from the schematic are automatically shown in the topology view and the harnesses are automatically defined. Inline devices can be easily added and alternate harness configurations can be tested quickly. Special reports provide details about the harnesses, including cost and weight estimates.

Integration between electrical and mechanical engineering

Supported MCAD tools:

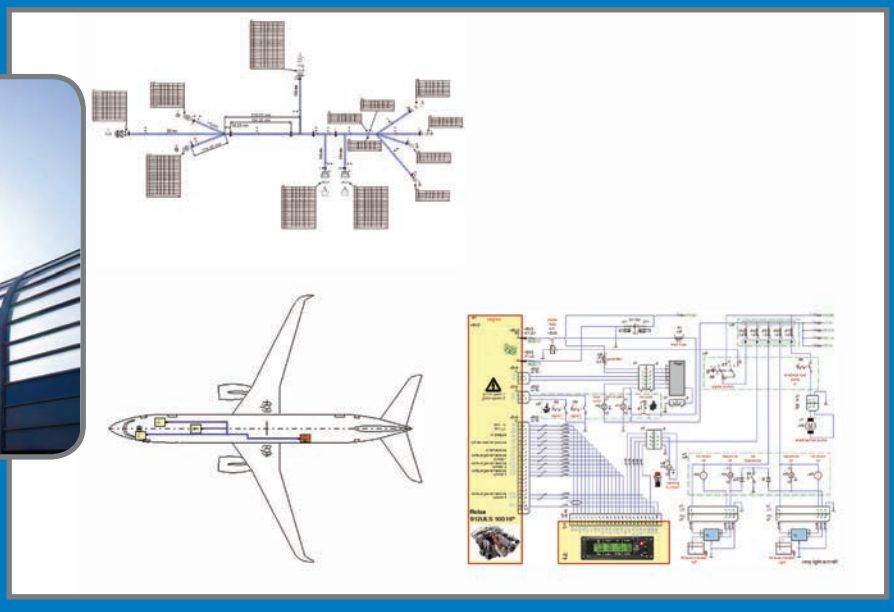
- Autodesk Inventor
- Dassault CATIA V5
- PTC Creo Direct
- PTC Creo Parametrics
- Siemens NX
- Siemens SolidEdge
- SolidWorks 3D CAD

E^3.topology

- Scaled product layouts
- Dynamic physical spaces
- Harness distribution capability
- Weight calculations
- Costing estimates
- Bundle diameter calculations
- Inline equipment

Configuration management

- Concept evaluation
- Development
- Design
- Verification/qualification
- Production
- Operation
- Maintenance
- Modification/enhancement
- Disposal



Manufacture

Harness creation

Whether carrying out build-to-print or working with your supply chain, E3.series helps drive harness creation. Alternate views of connectors and splices are laid out on either a scaled formboard sheet or on a cable layout sheet. Any changes to either the schematic or formboard design are immediately reflected across the entire project. Automatic part selection at the design phase ensures accurate details are passed to manufacturing, placing the focus on the design, and not on how to use the tools.

Testing

E3.series can interface with industry-standard and custom-built test equipment. The intelligence built into E3.series designs eliminates manual generation of netlist and pin information for test equipment. Using standard tools, data held in the E3.series project can be extracted in the required format, saving time and greatly improving accuracy.

Review and markup

To assist in the prototyping and manufacturing phases, E3.view and E3.redliner allow installation and production teams to reference native E3.series documents. E3.redliner is an intelligent markup tool that uses special view-only documents for its annotations. Markups are loaded back into the native E3.series project and an intelligent search feature helps designers navigate to each note and recommendation.

Driving change

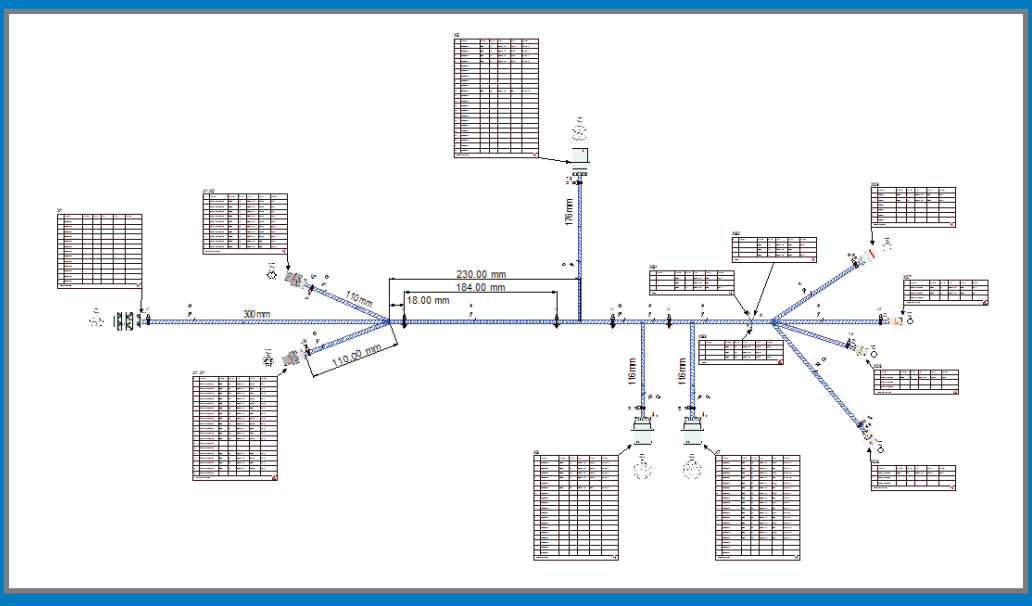
E3.Revision Management allows engineers to track all changes that occur through all phases of the product lifecycle. Complete projects and sub-projects are passed through release or pre-release stages and can be locked down to prevent modification. E3.Revision Management documents all graphical and textual changes and keeps a history of each revision. The resulting data can be incorporated into the engineering change process.

View and markup

- Create read-only view files
- View and print native E3.series files
- Markup field changes in E3.redliner
- Back annotate changes to the master project

Panel manufacturing

- 1:1 scaled panel drawings
- Easy-to-use drag and drop panel models
- Dynamic links to the schematic
- Slot and mount functionality
- Restricted area support
- Automatic wiring
- Shortest path algorithm
- Wire segregation
- Ducting fill degree
- 3D visualization



Formboard design

Maintain

Service documentation

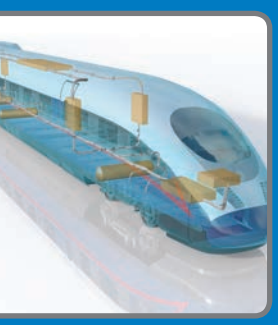
The final phase of most projects is creating the service documentation – detailed schematic and wiring diagrams supplied to the service engineers. This work is usually undertaken by the supply chain and can require a complete redraw of the wiring diagrams. Using the design data from E3.series, service documentation creation can be automated to eliminate costly rework.

E3.series Industry Editions

Specially configured electrical design suites to meet the needs of key industries, E3.series Industry Editions evolved through working with key customers in each of these sectors and contain functionality core to these industries.

E3.series Industry Editions:

- Machinery
- Mil/Aero
- Power
- Railway
- Systems
- Transportation



E3.series Mil/Aero Edition

E3.cable
Enhanced functionality for designing cables and cable harnesses. Different views of the design enable specific documents to be created for production, start-up and service.

E3.Extended Connector Handling
Standard connector representations for the automotive industry, showing continuation lines, backshell connections and block graphics.

PDF Output
Produces intelligent, multi-sheet PDF design outputs, with full project structure and built-in hyperlinks.

Options

E3.enterprise
The multi-user option for E3.series; allows multiple users to access the same project simultaneously with built-in access control and workflow capabilities.

E3.EDM
Zuken proprietary library and data management system for managing native E3.series library and project data and documentation.

E3.fluid
Integrated design solution for hydraulics, pneumatics, cooling and lubrication systems. Supports integrated electrical and fluid design.

E3.formboard
Creates build-to-print detailed 1:1 harness designs; linked dynamically to E3.schematic drawings.

E3.Functional Design
For creating system functions and their effects. Links logical schematic designs into functional diagrams and enables basic harness structuring.

E3.Harness Flattening
Automatically flatten geometric 3D harness structures ready for importing into E3.formboard.

E3.redliner
Markup documents in a protected read-only copy of the design. Playback and jump to all recommended changes in the master design.

E3.Revision Management
Document all physical and graphical changes between design iterations. Automatically produce engineering change order documentation.

E3.3D Routing Bridge
Transfer wire, cable and cable harness information to 3D MCAD systems. After routing, individual wire length data is transferred back to E3.series.

E3.Saber Frameway
A dynamic bidirectional link to Synopsys Saber – a leading industry-standard simulation tool for customers looking to carry out simulation of their E3.series projects.

E3.topology
Evaluate system harnesses early in the design flow for factors such as length, weight and cost. Enables tradeoff analysis of harnesses and sub-harnesses to optimize manufacturing, performance and cost.

E3.view
Free-of-charge viewer for all E3.series projects and special viewer files.

E3.Wiring Diagram Generator
Automatic wiring diagram generation with a configurable front end for producing service and field documentation.

About Zuken

The Challenge.
More quality, more functionality, in less time, with less cost; it's a common story in today's market place.

The increased competition and requirement to operate on a global scale make these end-user demands ever more challenging to meet. So companies need to be innovative and dynamic to stay one step ahead of the game – this is where Zuken can help.

What we do.
Zuken is a global provider of leading-edge software and consulting services for electrical and electronic design and manufacturing. Founded in 1976, Zuken has the longest track record of technological innovation and financial stability in the EDA and ECAD software industry.

The company's extensive experience, technological expertise and agility, combine to create world-class software solutions. Zuken's transparent working practices and integrity in all aspects of business produce long-lasting and successful customer partnerships that make Zuken a reliable long-term business partner.

Security of Solid Foundations.
Zuken is focused on being a long-term innovation and growth partner. The security of choosing Zuken is further reinforced by the company's people – the foundation of Zuken's success. Coming from a wide range of industry sectors, specializing in many different disciplines and advanced technologies, Zuken's people relate to and understand each company's unique requirements.

For more information about the company and its products, visit **www.zuken.com.**

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Find out more about our Mil/Aero Edition

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