

# Capital Logic

The de facto software solution for the electrical wire harness industry

Mentor  
Graphics®





## CAPITAL LOGIC

Wire system's related problems in complex vehicles today account for a very significant amount of the cost of the product. These costs are not only engineering and manufacturing, but also include the cost of warranty and extended service repairs once the vehicle is in service. To efficiently create and manufacture a wire system design, it is paramount that today's design automation tools have the ability to support the extended enterprise.

The Capital Harness Systems suite of tools provides software solutions across the entire wire harness design/build process. The Capital Design group of products provides tools to define the electrical connectivity, the geometric and environmental constraints of the product. Capital Logic is a data-centric, graphically based electrical wire systems diagram authoring and editing application that leverages Capital Manager as its data management facility. Capital Manager interacts with a relational database and stores all connectivity and data relationships.

# CAPITAL HARNESS SYSTEMS

Capital Harness Systems™ (CHS) is conceived as a complementary, end-to-end tool set for complex wire harness flows. Data is accessed centrally by Mentor Graphics designed or approved CHS tools to automate many steps in design, analysis and manufacture. CHS manages advanced harness concepts such as composite (variants and options), modular designs and effectivity throughout the product design life cycle. CHS shares data with legacy systems, MCAD and PDM tools as needed.

CHS consolidates many years of leading-edge harness design and manufacturing experience to assemble an integrated, data-centric solution whose tools always will evolve with a view to protecting customer investment.

## ● CAPITAL MANAGER

The heart of CHS, Capital Manager is accessed freely by all tools. In addition to providing common data storage and services to all CHS tools, it supports advanced concepts including composite and modular design, manages effectivity, options and variants and facilitates collaboration with legacy and MCAD systems.

## ● CAPITAL SYSTEMS

The Capital Systems™ family of tools is used by system designers for tabular and/or graphical capture of connectivity data. Subsequent storage within and re-use from Capital Manager facilitates the generation of full wiring diagrams.

## ● CAPITAL DESIGN

The Capital Design family of CHS tools create block, functional and wiring diagrams using powerful graphical editing capabilities or by synthesis from converged connectivity and topology data using customer specific design rules.

## ● CAPITAL HARNESS

Capital Harness™ acts upon design data to create fully engineered and costed harnesses drawn in 2D format. Extensive engineering validation and reporting outputs full bill-of-materials, labor and material costs plus feeds into downstream manufacturing and production applications.

## ● CAPITAL FACTORY

Capital Factory utilizes CHS data to aid production of the harness. A flexible formboard editing tool produces 1:1 assembly drawings while data feeds to production and test equipment further streamline the build process.



## ● CAPITAL ENTERPRISE

Capital Enterprise are enabled by the data-centricity inherent in CHS. Data exchange is now a simple process within the harnessing flow and can readily be achieved with third party mechanical, electrical, PDM software and in-house applications.

## ● CAPITAL VIEWERS

Capital Viewers automatically generates views of the data on demand. These views can then be expressed as a schematic diagram, text report or a graphical view.

## ● CAPITAL ANALYSIS

Capital Analysis tools are intended to interrogate CHS data at any time to assist in component selection and sizing. Capital Analysis will identify, and where possible quantify potential failure modes in a variety of scenarios. The system will interface with specialist analyst tools such as EMI/EMC and transient analysis simulators.

# Capital Logic

Capital Logic helps Electrical Systems Engineers and Harness Designers address the key problems they have today. Those issues include the need to manage electrical wire systems' data along the product life cycle taking into account the myriad of options and other data complexity issues. Today, most existing tools are architected on a file-based paradigm, which doesn't efficiently support the notion of design reuse, views of data when and where its needed, and accurate management of data as it matures though the lifecycle.

Capital Logic is based on data-centricity as its core architecture and, as such, provides significant added value as compared to non data-centric tools and processes. In addition, having Capital Logic as a data-centric application with Capital Manager as the core data management facility provides businesses with a front-to-back, design to manufacturing wire harness solution. This, combined with the necessary data bridges to external MCAD systems and PDM systems, will provide a comprehensive electro-



mechanical design environment.

To reduce the time it takes to gather information for design reuse and design reviews, Capital Logic utilizes AutoView technology to generate graphical representations of connectivity data from the database. This allows design teams to start designs with non-graphic legacy data. For reviews, design teams can quickly generate needed views for electrical analysis, complexity and cross subsystems analysis.

## AutoView Technology

Capital Logic's AutoView view generation capability provides the user a modern, easy to learn set of functionality that significantly

decreases time-to-productivity and decreases the cost-of-quality in their wire harness assemblies.

AutoView permits data to be rendered graphically even if it is entered as pure connectivity. Additionally, filtered views of connectivity data can be generated and displayed on demand.

## Capital Manager

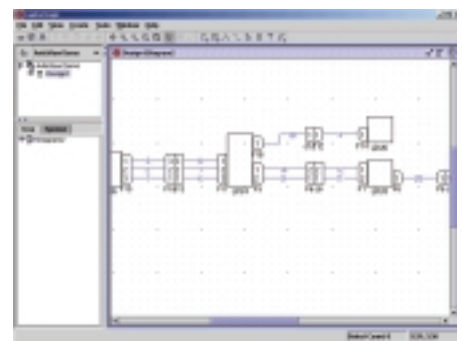
Is the centralized design data management (DDM) capability of the CHS product suite. At its heart is a relational database with an accompanying mechanism that offers data persistence to the CHS products. This is surrounded by data management services providing (amongst others) user access control, version management and complexity management.

- With electrical wiring systems becoming more complex, design and manufacturing costs have become difficult to manage.
- As design cycle times continue to shrink, the ability to add and manage late feature changes are causing significant time-to-market and warranty problems.
- Design re-use is less effective if change control cannot be properly implemented, due to lack of functionality in existing file based design tools.

To address these compelling business issues, it is mandatory for a design-to-manufacturing environment to provide efficient management of data throughout the flow.

Capital Manager plays a key role in solving these difficult business issues by using a common repository for electrical data and supports advanced concepts including composite and modular design. It manages effectivity and options while facilitating collaboration with MCAD systems. This allows customers to manage complexity while sharing design data across design domains.

Capital Manager is based on a stateless Object Oriented architecture that allows the design environment the performance needed while insulating against technology shifts.





### Capital PROJECT

Enables Administrators and Designers to organize and configure all projects data. A project may be considered to be a multi-variation product such as a specific aircraft type or a car vehicle model-year.

### Capital USER

Enables Administrators to organize and control user access to the enterprise's electrical design data. Supports several concepts that provide a significant degree of flexibility in configuring access control.

### Capital LIBRARY

Provides component part management services for the CHS product suite. It is used to define and manage corporate part conventions and notations such as color codes, standard part types and wire specifications.

### Capital REPORTER

Takes the results of a query and generates textual reports based on user input. The user can set up these reports using Extensible Stylesheet Language (XSL). A specific configuration may be specified if the results are to be "evaluated" based on a set of options.

### Capital Logic key Features

- Data Centric – Integrated with Capital Manager
- Window cross highlighting – Multiple windows
- Standard features for save, load, open, print, undo/redo etc.
- Tool tips and online help

- Pan and zoom featuring "Strokes" shortcuts and Mouse wheel
- Orthogonal routing toggle
- Use of symbols – Symbol browser and preview window
- Automatic numbering of design objects
- Automatic generation of name compositions
- Parameterized devices - Automatic generation of pins
- Intuitive user interface



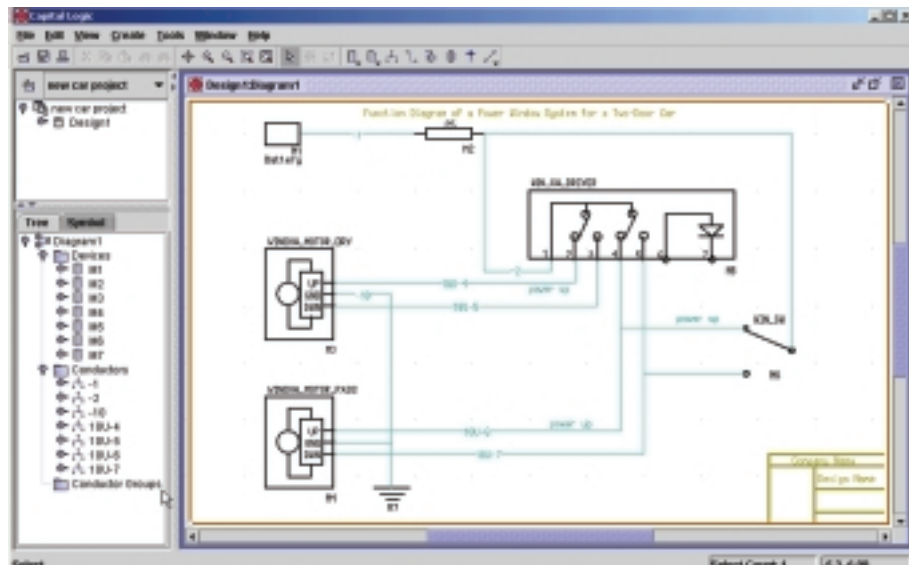
- Automatic orthogonal routing
- Drawing and text annotation capability
- Intuitive user interface
- Drawing and text annotation capability
- Easy shield termination definitions
- Use of shared design objects
- Automatic insertion of splices

### View generation

- Auto generation of graphical view from connectivity data using AutoView
- User defined report generation from queries

### Design Data Management (DDM)

- Component part management services
- Part number management
- Part relationship management
- User-defined properties
- Organize and control user access to enterprise design data
- User defined roles and permissions
- Allows designers to organize and configure all project data
- Project configuration management
- Design version management
  - Effectivity
- Design complexity management
  - Options
  - Modules
  - Variants
  - Configurations



## About Mentor Graphics

Mentor Graphics is a technology leader in electronic design automation (EDA), providing software and hardware design solutions that enable companies to send better electronic products to market faster and more cost-effectively. Mentor Graphics Harness Systems expands that focus by providing software tools that address the whole process flow from system concept through to manufacture, enabling companies to gain that vital competitive edge.

As the complexity of today's electronic systems increases, the design of the system-level interconnect must be regarded as an integral part of the total system design. Our unique blend of software solutions and wire harness industry expertise has ensured that Mentor Graphics is the market leader in this field.

- Publicly held (NASDAQ: MENT)
- Founded 1981, with headquarters in Wilsonville, Oregon
- Approximately 2,975 employees worldwide
- Revenue in last reported 12 months: in excess of \$600 million
- World-class research and development
- Over 55 offices worldwide
- Strategic partnerships with leading electronics manufacturers and EDA vendors for development of new design solutions and methodologies
- Proven track record of success in the Automotive and Aerospace industries

**To learn more about how Mentor Graphics Harness Systems can help you improve your wire harness design process, call us today, or visit our website at [www.mentor.com/harness](http://www.mentor.com/harness).**

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