Capital Harness

The de facto software solution for the electrical wire harness industry

Mentor Graphics®

CAPITAL HARNESS

A comprehensive set of software tools that enable the design, engineering for manufacture, validation and costing of complex open loom wire harnesses. The product suite includes a powerful graphical harness design interface, automated harness engineering and validation capability, comprehensive reporting, analysis and costing features.

Capital Harness Overview

Capital Harness™ takes physical and electrical system requirement data and enriches the information to produce engineered and costed harnesses drawn in 2D format. Extensive engineering, validation and reporting features furnish a full manufacturing bill-of-materials, associated labor and material costs, plus feeds into downstream manufacturing and production applications.

Capital Harness comprises of two key elements Capital Engineer and Capital Costing

Capital Engineer provides a graphical harness drawing environment for engineers to view and modify design information. Its automated engineering and validation routines facilitate the component selection and engineering process ensuring the completed harness are correct by design and correct for manufacture.

Capital Costing takes the completed harness designs and automatically calculates assembly times and material costs accurately and quickly.

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 imports from and shares data with legacy systems, MCAD and PDM tools as needed.

In a full CHS flow, system connectivity is imported into Capital Manager™ and converged with topology data to route and partition harnesses automatically. Capital Design™ tools are used to create block, functional or wiring diagrams and allow graphical editing prior to saving. Capital Harness™ embellishes these logical designs with engineering data for costing and manufacture. The completed designs are then released into Capital Factory™, which automatically creates formboard drawings and other assembly aids. Capital Analysis™ tools can be used throughout the flow to assist in component selection and to identify failure modes. Capital Bridges™ facilitates the use of third party and legacy products and exchanges MCAD data for collaborative design. Capital Viewer™ tools automatically generates views of the data on demand. These views can then be expressed as a schematic diagram, text report or a graphical view.

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. It supports advanced concepts including composite and modular design, manages effectivity, options and variants and facilitates collaboration with legacy and MCAD systems.

CAPITAL SYSTEMS

Capital Systems™ describes tools used by system designers for tabular 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 logical designs 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 Engineer

Capital Engineer enables the design, engineering and validation of complex wire harnesses for manufacture.

Manufacture - Key benefits:

- A powerful graphical design environment developed specially for the wire harness industry
- Support of complex wire harness configurations including options, variants and modules
- Full bill-of-materials and harness validation calculation routines based on industry best practices
- Comprehensive component definition and management functionality
- Powerful reporting and analysis, including harness comparisons, wire cutting charts, tooling reports and weight calculations

Harness Industrialization
Design functions allow base harness designs to be created from the ground up or enhanced from imported data. Harness designers can quickly lay out bundles, add components stored within Capital Manager and define wires. Automatic selection of components such as terminals and seals speeds up the design process. Powerful viewing and search features allow users to navigate complex harness designs.

Complexity Management
Capital Harness supports the variant and options design concept throughout. Harness definition maintenance overhead is reduced and redundant wire and connectors can be eliminated, saving weight and reducing cost. Complexity management is further enhanced with Capital Modular. This allows designs to be defined on a module-by-module basis based on its technical features.

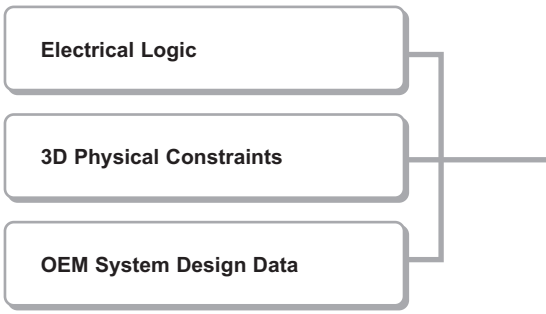
Change Management
A large percentage of a harness maker's workload is taken up dealing with design changes, Capital Engineer ensures that modifications to harness designs can be made efficiently. As Capital Engineer stores all data relating to a harness in Capital Manager, the designer can copy an existing harness and modify it rather than starting from scratch. The system provides a complete audit trail of the changes made.

Design Data Import
Through a comprehensive set of interfaces, harness data can be imported into Capital Engineer from the leading 3D physical and 2D electrical schematic systems ensuring maximum data re-use. This eliminates duplication of data entry and speeds up the design-to-manufacture process.

Engineering and Validation
Engineering routines automatically optimize splice positions and calculate precise wire lengths, bundle sizes, taping quantities and tube lengths to produce a full manufacturing bill-of-materials. Capital Engineer allows users to check that engineered harnesses are error free before they go to production. The validity checking identifies errors and eliminates costly re-work and delays.

Reporting and Analysis
Capital Engineer enables data-centric reporting and analysis on harness designs. Tasks for producing information such as tool usage reports and wire cutting sheets are completely automated. Harness weights can be calculated at the touch of a button along with analysis such as bundle by bundle breakdowns and harness statistics reports. Users are also able to create their own custom reports.

Component Library Management
Harness components such as connectors, wires, multicores and harness coverings can be created or imported into Capital Engineer. Copy, component prototype and family features exploit the power of Capital Manager to eliminate laborious component management tasks.



Capital Costing

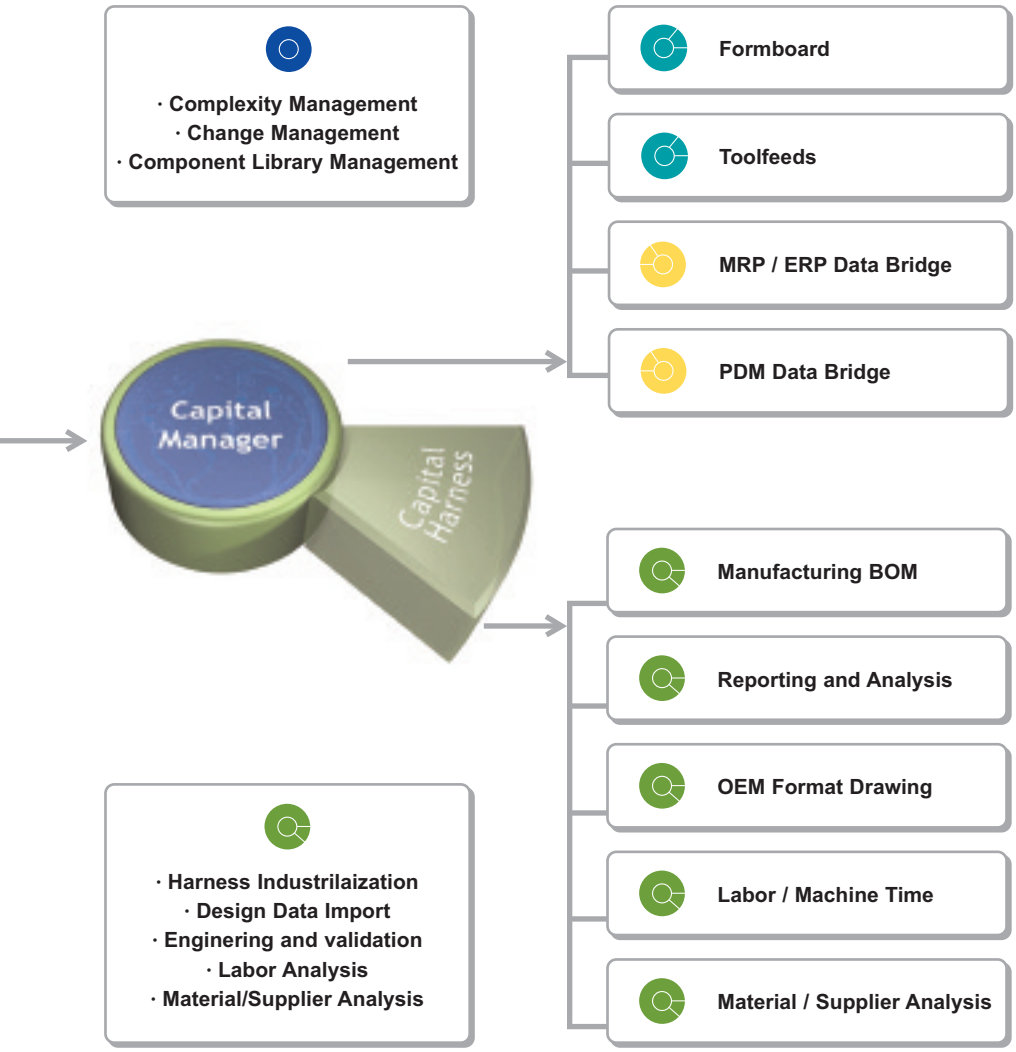
Capital Costing is an automated harness costing system within Capital Harness that calculates both harness assembly times in terms of a labor and machine overhead and material purchasing costs and selling prices.

Labor - Key benefits:

- Company configurable cost methods, allowing the creating of complex labour costing formulae
- Cost method hierarchy allows for multi-layering of cost calculations
- Consistent, accurate labor costings in minutes

Material – Key benefits:

- Multiple buying and selling prices for a single component
- Exchange rate and copper factor management
- What-if costing scenarios are easily configurable
- Database-based application provides powerful reporting and analysis capabilities such as internal price negotiation reports and supplier expenditure analysis



Capital Costing

Capital Costing automates the costing function, producing results in minutes, compared to days or even weeks when costing manually. Capital Costing enables a fast response and complete control of profit margins throughout the project. Quick and consistently accurate quotes, right first time, are clear business benefits.

Labor Analysis

Capital Costing performs harness labor and machine time analysis based on the harness definition stored in Capital Manager. Most company costing standards are complex. By using Capital Costing, with its extensive set of harness variables and user definable costing formulae, standards can be fully defined and automated.

Material And Supplier Analysis

Capital Costing provides a single repository for all cost and price data and ensures correct results. Cost variations from imported data can be recorded for each component including multiple supplier and purchase costs and differing selling prices depending on customer. Cost models allow for testing of 'what if' scenarios, varying copper commodity rates, component purchase costs and selling prices, using a variety of exchange rates.

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.

Corporate Headquarters
Mentor Graphics Corporation
8005 SW Boeckman Road
Wilsonville
OR 97070-7777
Tel. No: 1 503-685-7000

U.S. Sales: 800-547-3000

European Headquarters
Mentor Graphics
Elsenheimer Str. 41-43,
80687 Munich,
Germany
Tel. No: 49-89-57096-0

Pacific Rim Headquarters
Mentor Graphics (Taiwan)
Room 1603,
16F International Trade Building
No. 333, Section 1,
Keelung Road,
Taipei, Taiwan, ROC
Tel. No: 886-2-87252000

Japan Headquarters
Mentor Graphics Japan Co.Ltd
Gotenyama Hills 7-35,
Kita-Shinagawa 4-chome,
Shinagawa-Ku, Tokyo 140
Tel. No: 81-3-5488-3030

Mentor Graphics
Harness Systems
Mentor House
Edward Court
Broadheath
Altrincham,
Cheshire,
WA14 5GL
United Kingdom
Tel. No: 44-161-926-1600

Mentor Graphics is a registered trademark and Capital Harness Systems, Capital Manager, Capital Bridges, Capital Capture, Capital Design, Capital Analysis, Capital Factory, Capital Formboard, Capital Costing, Capital Harness are trademarks of Mentor Graphics Corporation. All other company or product names are the registered trademarks or trademarks of the respective owners.