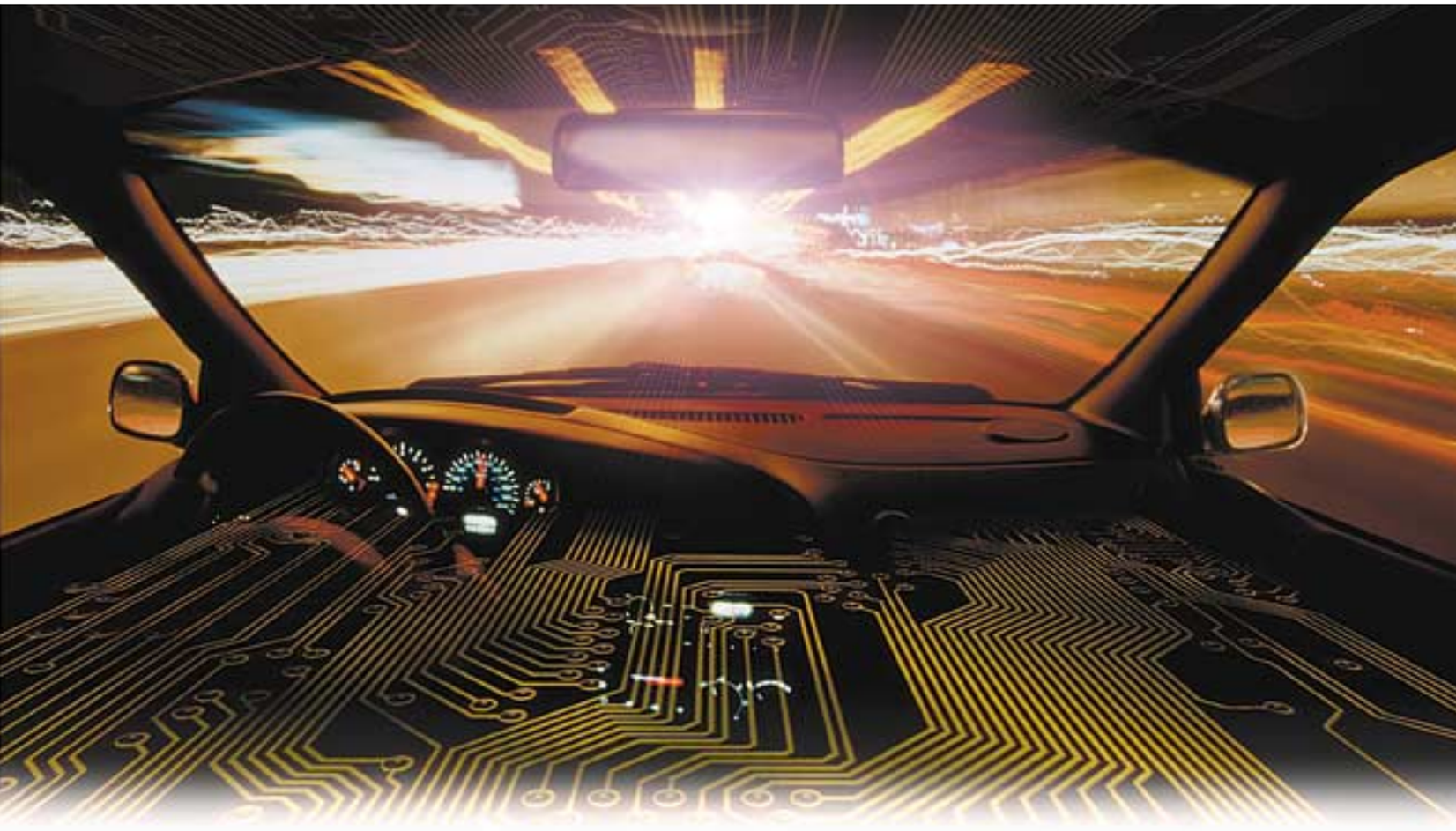
DELPHI

Automotive Systems

Electrical/Electronic Systems



Driving Tomorrow's Technology

Delphi

Delphi Automotive Systems is a world leader in transportation and mobile electronics components and systems technology. Delphi's three business sectors—Dynamics & Propulsion; Safety, Thermal & Electrical Architecture; and Electronics & Mobile Communication—provide comprehensive product solutions to complex customer needs. The company is headquartered in Troy, Michigan, U.S.A., with regional headquarters in Paris, France; Tokyo, Japan; and São Paulo, Brazil. Delphi maintains a global presence consisting of wholly owned manufacturing sites, joint ventures, customer centers, sales offices, and technical centers. Delphi can be found on the Internet at www.delphiauto.com .

Inspiring solutions through integration.

Today's automobile consumers are demanding an increasing number of value-added features, many of which are controlled by a vehicle's electrical and electronic (E/E) system. In fact, a vehicle today has approximately double the E/E functions of one produced just 10 years ago. This trend requires electrical system designs that provide both increased functionality and ease of assembly.

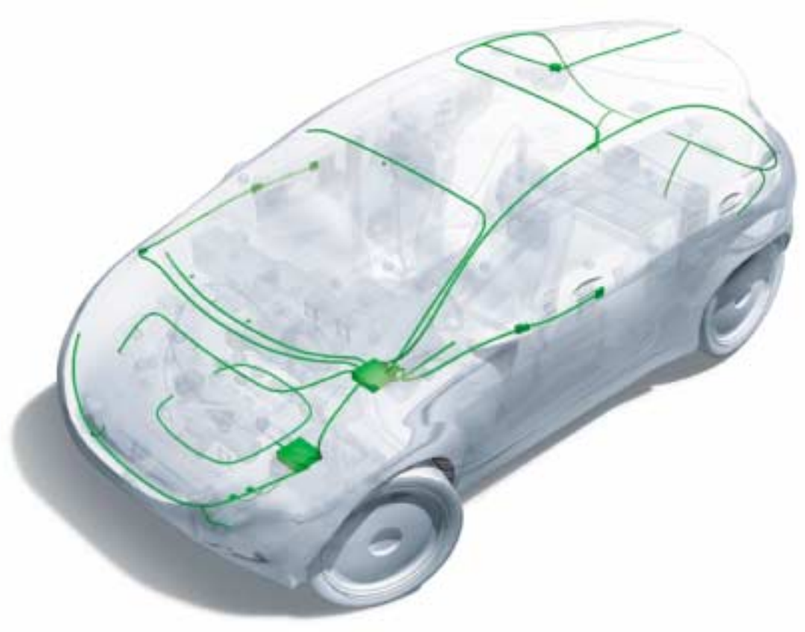
Delphi's Integrated Vehicle Electrical/Electronic System (IVEES) offers total vehicle solutions that help efficiently and dependably manage total vehicle electrical system content and complexity. Produced through the application of sophisticated engineering design and modeling tools, IVEES combines all electrical and electronic vehicle functionality into an optimized system. IVEES is adaptable to multiple vehicle options and flexible for future upgradeability. Through IVEES, Delphi applies various state-of-the-art technologies, including:

- Higher- and multiple-voltage power generation and storage
- Networked communications (multiplexing)
- Fiber-optic communications
- Multi-drop wiring
- Networked controllers with distributed computing, standard interfaces, and mechatronics (electronics integrated into switches, connectors, sensors, and actuators)

This unique combination of these and other technologies creates an integrated vehicle electrical and electronic system that is tailored to each individual vehicle. The IVEES helps optimize system reliability and safety while helping achieve efficiencies in power generation and storage, mass reduction, and elimination of electrical interfaces.

The IVEES comprises various elements, each designed and produced by Delphi:

- Power and Signal Distribution Systems
- Ignition Systems
- Electrical/Electronic Centers
- Fiber-Optic Solutions
- Switch Products
- Connection Systems



Delphi subjects its products to a barrage of environmental testing to help ensure reliable performance under the toughest conditions.

Power and signal distribution systems

State-of-the-art design and manufacturing capabilities.

Primary Wiring
Delphi is a world leader in the design and manufacture of power and signal distribution systems. Whether build-to-print or custom design, from prototype through custom packaging and delivery, Delphi supports customer requirements.

Our comprehensive global capabilities begin with quality cable and components. We use state-of-the-art lead processing equipment and wiring assembly tooling as well as globally consistent processing technologies to produce high-quality wiring systems. Each wiring system is completely tested for electrical, mechanical, and functional performance prior to shipment.

Our lean manufacturing process assures minimal levels of in-process inventory. This helps us respond quickly to customer design and schedule changes.

We deliver products according to any specific customer requirements for packaging, sequencing, and shipment anywhere in the world.

Our customer commitment includes product installation training and other types of service training, all performed by our qualified on-site engineers.

Ignition Systems
Delphi designs and produces ignition components and systems for global original equipment manufacturer (OEM) and after-market applications. Our products include bulk ignition cable, spark plug boots, nipples for distributors and coils, fasteners, routing hardware, organic and inorganic insulating compounds, as well as complete wiring sets for both conventional and coil-near-plug ignition systems.

Delphi combines these world-class ignition components into custom assemblies to provide high-voltage energy systems. Whether a vehicle requires traditional ignition wiring or unique coil-near-plug wiring, Delphi meets its customers' global ignition system needs.

Ignition wiring assemblies

To help ensure product reliability, Delphi thoroughly evaluates and tests IVEES designs during the product development process.

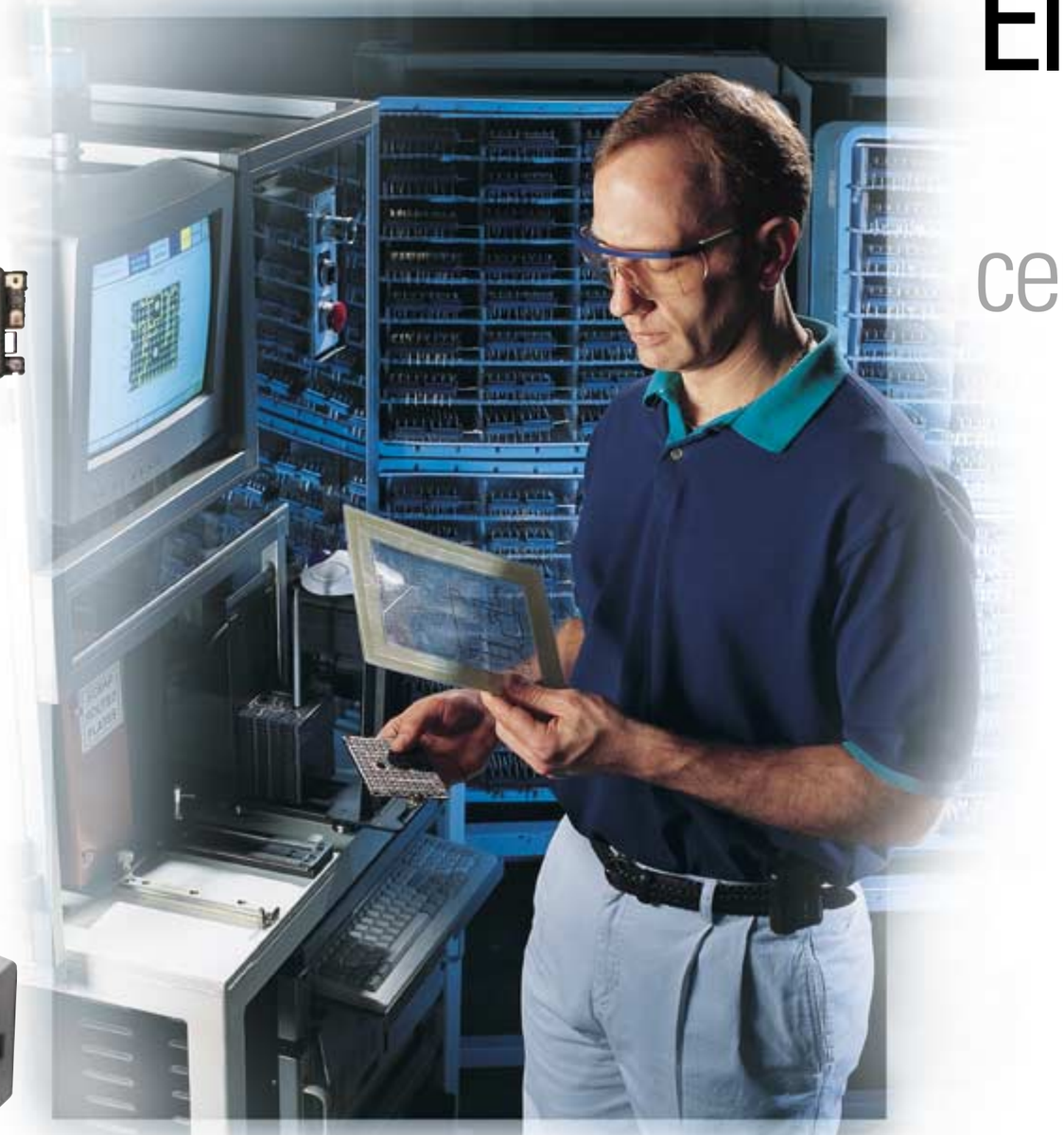
Power and signal distribution system

Electrical center with integrated electronics

Routed wire electrical center

Printed circuit board electrical center

Electrical center with plug-in module



Our routed wire Bussed Electrical Centers offer key benefits over traditional centers, including less costly and faster engineering changes, shorter design lead times, lower product piece cost, and longer product life cycles.

Electrical/ Electronic centers

High functionality with reduced complexity.

Delphi's E/E centers provide centralized electrical power and signal distribution and all of the associated circuit protection and switching devices. By combining fuse and relay centers, splices, and harness-to-harness interconnects in centralized adaptable packages, we are able to help reduce the complexity of the vehicle wiring system. This results in a simplified electrical architecture that reduces cost and mass.

We feature custom-designed Bussed Electrical Centers (BEC) with our patented routed wire technology, as well as centers utilizing stamped metal and printed circuit board technology. Our routed wire electrical centers help provide both robust performance in any environment and fast, flexible, cost-effective engineering changes.

Most vehicle electrical changes can be accommodated by simple software program revisions to our computer-controlled wire routing process, as opposed to the time-consuming and expensive tooling changes typical of most E/E centers.

We also design custom E/E centers that accommodate plug-in electronic modules or incorporate fully integrated electronic functions.

Delphi integrates state-of-the-art electronics technology with advanced power and signal distribution system architecture to help optimize a vehicle electrical system.

As part of the design and testing process, Bussed Electrical Centers are cycled to simulate vehicle operation.

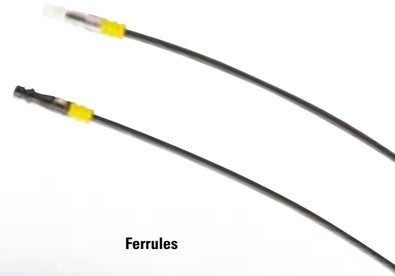
Fiber-optic solutions

For communications and lighting.

Male and female in-line connectors

Passive optical star coupler

Fiber-optic header connector



Ferrules

Fiber-Optic Communications
Delphi has developed Plastic Optical Fiber (POF) technology as a proven alternative for vehicle data transmission applications such as Digital Data Bus (D2B), Media Oriented Systems Transport (MOST), Mobile Media Link (MML), and others. For large and rapid data transmission requirements, our POF system provides improvements in speed, signal clarity, and cost over conventional wire-based technologies. Our low-loss connectors can be designed to accept both electrical and optical interfaces within the same connection system.

Along with the increasing use of the Internet, high-end audio systems, and video playback devices, there has been a corresponding increase in the amount of data and information that is created and distributed throughout today's vehicles. Delphi offers POF data transmission technology as a solution that accommodates large bandwidth, helps assure electromagnetic compatibility, reduces weight, supports a simplified system architecture, and is cost-effective.

Fiber-Optic Lighting
Delphi uses a centralized source to provide lighting to multiple locations throughout the vehicle for both passenger safety and convenience applications. These applications include interior courtesy lighting, perimeter lighting, and decorative lighting.

Similar to fiber-optic communication products, Delphi fiber-optic lighting products also feature POF technology, which helps provide improved reliability, design flexibility, and reduced power consumption.

Delphi designs, engineers, manufactures, tests, and delivers total fiber-optic communications and lighting systems to meet customer needs.

Delphi's Electromagnetic Compatibility Lab tests the compatibility of products within the electromagnetic environment. This testing helps assure that a switch incorporated with electronics does not generate—or is not affected by—electromagnetic interference.

Multifunction column switch

Wiper/cruise/rear defog switch

Driver's door switch

Switch products

System-activated or driver-controlled.

Delphi Automotive Systems produces a variety of switch products for virtually every vehicle application. With more than 50 years of experience in the switch business, we design our switches to meet our customers' packaging, styling, functional, performance, and ergonomic requirements.

Delphi's driver- and passenger-controlled switches feature the tactile feel and styling that today's consumers demand. Our products, which include power window and headlamp switches, enhance and complement the styling of today's vehicle interiors while providing ease of control and long service life.

Our system-activated switches, including brake pedal and doorjamb switches, provide an effective interface among the vehicle's automated functions. These switches incorporate contact systems for both high- and low-current applications.

We also produce smart switches that help enable optimization of the electrical/electronic system. Smart switches incorporate databus communications with integrated electronics, resulting in improved reliability and reduced mass and cost.

Delphi has a licensing agreement with Duraswitch Industries Inc. for exclusive rights to supply Duraswitch's revolutionary magnetically coupled switch technology to the automotive industry.

Duraswitch's patented magnetic-based design provides for consistent tactile feedback, low profile packaging, and an extremely durable and reliable assembly. This design easily incorporates into flat panel, electronically integrated switch packaging that is required in advanced electrical/electronic architectures.

DURASWITCH®

Duraswitch technology

Transmission gearshift system

Transmission gearshift internal components

Connection systems

Catalog series or custom designs.

Delphi Automotive Systems is a leading supplier of electrical/electronic connection systems. Our connections are the linking technology to physically integrate wiring, flexible circuits, switches, electronic products, and devices for complete power and signal distribution systems. Our thorough understanding of interconnect requirements, global presence, and world-class engineering and manufacturing enable us to meet any vehicle requirement as well as satisfy a wider range of non-vehicle needs.

Our comprehensive portfolio ranges from signal level through high-power connection systems. These include both unsealed and sealed ergonomically designed connections for in-line, device, header, and sensor applications.

Extensive lab and field testing confirm Delphi's superior design and manufacturing capabilities.

Catalog Series Connection Systems

- **GT Connection Systems™** provide low engage force, tangless terminals, and primary lock reinforcement.
- **Packard Micro64** is a compact electrical connection system designed for low-energy, high-density electronic applications.
- **Metri-Pack™ Connections** contain an extensive line of products for low-energy through high-current applications.
- **Micro-Pack Connections** are designed for electronic applications under-hood or in the passenger compartment.
- **Ducon™ Connections** utilize two-piece terminals that provide superior mechanical and electrical performance in a complete range of terminal sizes.
- **Weather Pack** is an environmentally sealed connection system for both power and signal applications.
- **Other related products**, which collectively provide a complete line of interconnect products.

Delphi also has the ability to customize any of the Catalog Series Connection Systems offerings. For example, mechanical assists are available on many of our connection systems to facilitate hand-mating of high I/O connections.

GT Connection Systems

Packard Micro64 connections

Ducon connections

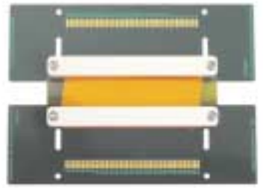
Mechanical assist connections

Connection systems continued

Specialty Connection Systems

These technologies provide unique custom solutions for specific customer requirements.

- **Gold Dot Connections**, with integral shaped planar contacts, enable high-speed/high-density data transmission.
- **Smart Connectors** contain integrated electronics.
- **Insulation Displacement Connection (IDC) Products** allow connections to be made without stripping cable.
- **Multi-Drop IDC Connectors** can be applied anywhere along a three-wire multiplex circuit.
- **High-Power Connections**, which can handle up to 300-amp loads, facilitate a hand-mateable operation that enables tool-less assembly and reduces assembly damage.
- **Fiber-Optic Connections** are used for optical data communication and lighting.
- **Splice Savers**, which may be either grounded or non-grounded, sealed or unsealed, provide one or several splices within a single connection assembly.
- **Dock and Lock Self-Aligning Connections** allow the blind mating of modular electrical devices.

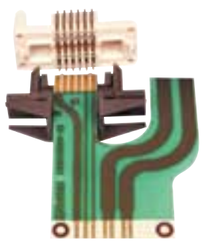


Gold Dot jumper connector

Smart connector

Multi-drop connectors

Splice saver connections



Dock and Lock connection

Delphi utilizes electron microscopy for materials analysis.

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