Custom military and aerospace cable assemblies and wiring harnesses
Over 50 years of custom cable assembly and wiring-harness heritage

Heritage-proven products and custom capabilities position Eaton as a primary source for harsh-environment cable assemblies and wiring harnesses for all physical domains: air, space, sea, and terrestrial.

Eaton can provide custom cables and wiring harnesses for turnkey design, collaborative co-development, or build-to-print programs. End-to-end connectivity capabilities include:

- Application-specific solutions for high currents and voltages, Ethernet, and RF applications
- Single and multiple-layer foil and braided EMI/RFI shielding
- Extreme temperatures, shock, vibration, radiation, corrosive media, vacuum, and pressures up to 20,000 PSI
- Integrated mechanical tow, fluid delivery, and cable separation and release capabilities
- Water blocked and pressure balanced oil filled subsea cables

Military and aerospace program heritage includes:

- Mobile-launch systems
- Shoulder-fired missile launchers
- High-altitude-missile defense
- Mine countermeasures
- Naval-weapons systems
- Ballistic missiles
- Airborne-weapons systems

Three strategically-located facilities

Eaton offers customers three manufacturing facility options to meet a broad range of logistics, cost, and compliance requirements:

- Camarillo, California, 116K square feet
- Chelsea, Massachusetts, 33K square feet
- Nogales, Mexico, 85,000 square feet

All facilities are certified to ISO9001:2008. The Camarillo and Nogales facilities are also certified to AS9100 Rev. C.

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<thead>
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<th>Certifications and compliances</th>
<th>MA</th>
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<tr>
<td>IPC J-STD-001 E certified solderers</td>
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<td>NASA NHB-5300 workmanship standards</td>
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<td>IPC620 Class III compliant assembly</td>
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End-to-end connectivity solutions for harsh-environment applications

Precise positioning of cable branches and connector-mounting flanges are confirmed by test fitting the cable assembly to the mounting rail in this air-to-air missile application.

This ICBM cable assembly features an Eaton designed custom connector, MIL-DTL-38999 connectors, induction soldering and continuous nylon-fabric braiding.

Rectangular and mil-circular connectors and electromechanical components are integrated with a mounting bracket in this anti-aircraft and anti-missile weapons system solution.

Two polyurethane overmolds and an integral custom spring maintain the critical contours of this cable assembly in a naval, surface-to-air missile system.

Tight-tolerance design and assembly supports fitting this seven micro-D connector solution into a confined space, naval-weapons-system application.

Design and assembly of this weapons system solution includes a multi-branch laced harness, polyurethane overmolding and a mounting bracket.
Accelerated design-to-delivery cycle times

Eaton combines advanced engineering tools with an extensive array of manufacturing resources to quickly deliver custom cable assemblies and wiring harnesses.

Eaton’s engineers leverage their in-depth understanding of production processes to improve manufacturability.

High-speed planetary cabler eliminates minimum cable requirements and supports helically and contra-helically laid cables.

In-house designed braiders support any combination of foil and braid shielding to provide > 90% optical coverage.

Heritage-proven standard connectors and custom capabilities streamline end-to-end interconnect-solution development.


Insourced and outsourced mold capabilities support a wide range of standard and custom requirements.

Overmolding resources include over 20 compression and transfer molding machines.

Test capabilities include DWV, IR, RF, and quick-ramp-rate temperature cycling.
In-house planetary cabler eliminates minimum cable requirements

Eaton’s in-house planetary cabler facilitates high-speed cable winding and incorporates taping heads that can apply shielding foils, Mylar tapes and binders during the cabling process and reduce cable manufacturing time and cost.

Additional high-speed-winding capabilities include:
- Supports helically and contra-helically-laid configurations to provide maximum cable flexibility
- Accommodates over 36 feed positions depending on component size and construction
- Produces 1/8” to 1-1/2” outside diameter cables utilizing 28AWG through 1/0AWG conductors or pairs

Eaton’s in-house cable winding capabilities can reduce manufacturing time and cost for multi-cable configurations such as the solution depicted to the left which contains 8 custom-cable assemblies. This end-to-end interconnect solution also includes:
- 15 overmolded connectors
- 3 backshells and 2 molded junctions
- An integral energy chain assembly with brackets

Custom-wound cable, up to 1-1/2” outside diameter, exits the planetary winder above the control panel on the left. Over 36 wires can be concurrently wound to support a wide range of customer requirements.
Lacing and overbraiding design options

Eaton’s custom-cable capabilities can support an extensive array of harsh environment wire lacing, any combination of foil and braid EMI/RFI shielding, and protective overbraiding requirements.

In-house capital equipment includes customized braiding machines that can optimize braid angles to facilitate > 90% optical coverage and effective EMI protection for a wide range of cable and wiring harness sizes and complexities.

Fabric and metal braiding features include continuous, uniform coverage even around branch junctions.

Braided textiles include: Kevlar, Nomex, Nylon, Polyethylene, Polyester, and Teflon.

Foil shields include aluminized Mylar and MuMetal. Braided metals include:
- Nickel, silver, or tin-coated copper
- Tinned copper-clad steel
- Stainless steel
- Aluminum

This harness provides 384 connections and incorporates a continuously-braided EMI shield and Nomex overbraiding, 15 connectors, 8 ferrites, 2 switches and a mounting flange installed over a slip-ring assembly.

Customized braiding machines facilitate optimization of braiding coverage and angles to support application-specific mechanical and EMI/RFI requirements.
Jacketing and overmolding capabilities extend from cable assemblies utilizing standard military connectors (depicted above) to custom solutions such as the 4160V connectors depicted to the right. This high-voltage cable assembly was designed to provide power to a high altitude, ballistic-missile-defense system. A void free, 6.5” (165mm) diameter by 10.5” (267mm) length overmold is facilitated by tooling that is designed and machined in-house. High-voltage insulation and shielding performance is verified by corona testing.

Eaton’s inventory of overmold cavities includes MIL-DTL38999, MIL-DTL83513 micro and MIL-DTL24308 D-subminiature. Accelerated custom-mold development is supported by a combination of insourced and outsourced mold-making resources.

An extensive array of overmolding equipment includes:
- Eighteen small-form-factor (4” to 6” stroke) compression-molding machines
- Five transfer-molding presses with 15 to 75 ton capacities
- Low pressure, hot-plate-molding equipment

Jacketing materials include:
- Blown-on EPDM, polyurethane and neoprene
- Shrunken polyolefin
- Braided Kevlar, Nomex, nylon, polyester
- Convoluted tubing

Overmolding materials include:
- Transfer-molded EPDM, Hypalon, Neoprene and Viton.
- Press-molded epoxies, polyurethanes, and silicones

Specialized primers facilitate maximum overmold-to-substrate adhesion to ensure separation-free bonds in harsh environments.

NAVSEA S9320-AM-PRO-020/MLDG certified processes provide void-free overmolds

EATON Custom military and aerospace cable assemblies and wiring harnesses

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For additional information
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