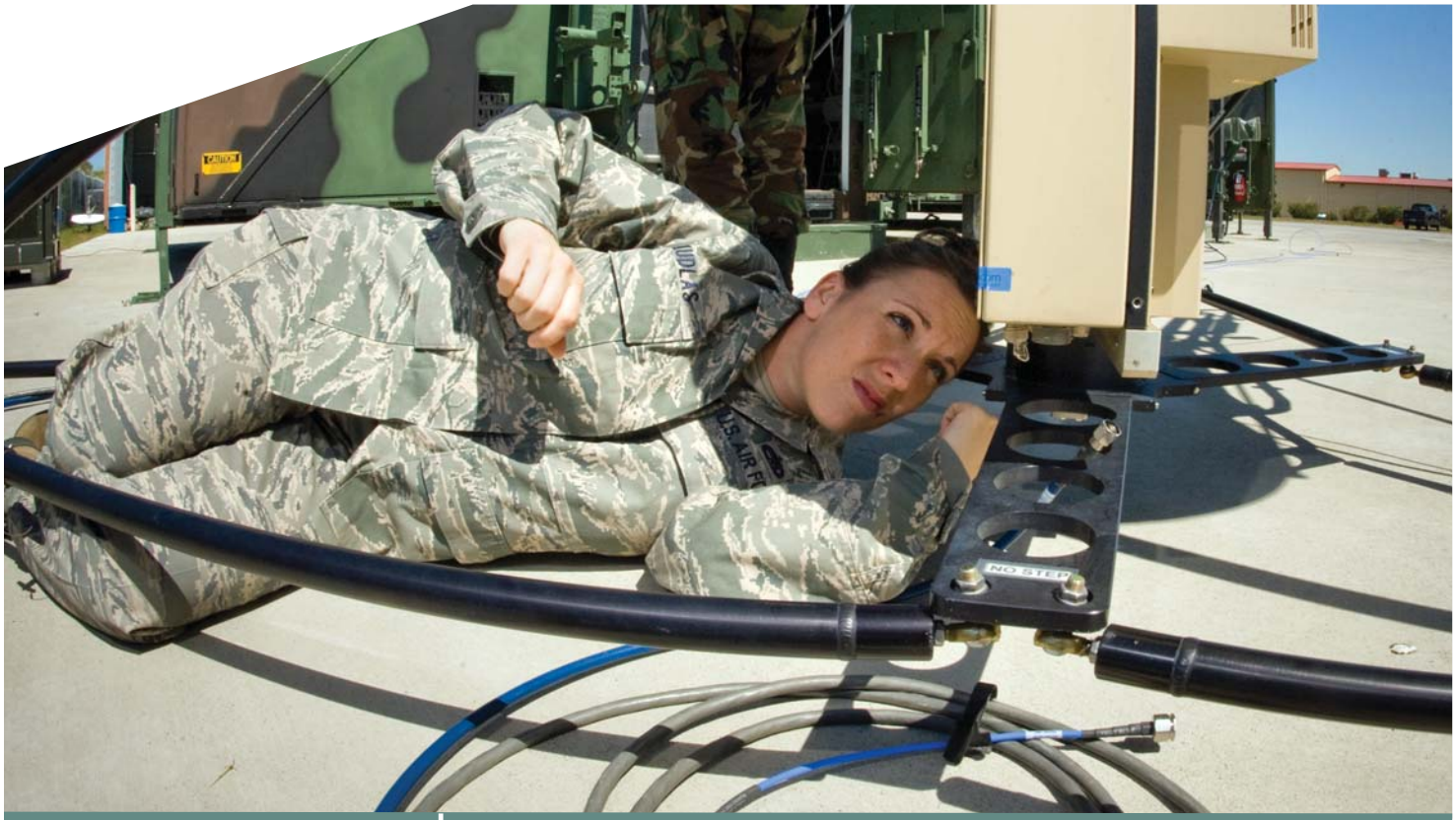
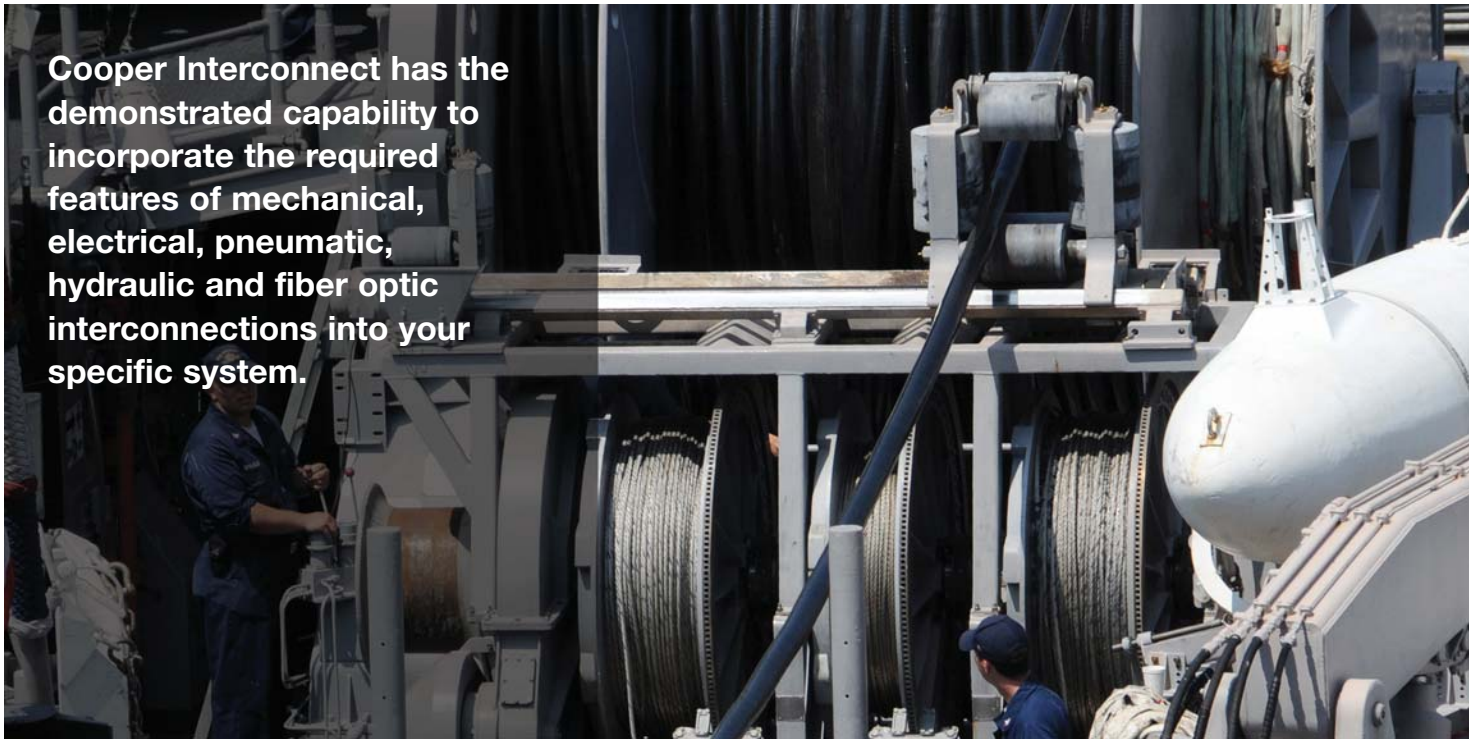


Cable Assembly Capabilities

COOPER Interconnect

Solutions
You Can Trust

Cable Assembly Capabilities



When it comes to cable assemblies, Cooper Interconnect is a global leader in the design, development and manufacture of cable assemblies and wire harnesses. With over 50 years of expertise in engineering, quality systems, equipment and processes, we provide assembly solutions to the most stringent specifications and the harshest environments. With manufacturing locations across the U.S., we offer fully integrated services with design assistance, component specification, tooling and prototype design.

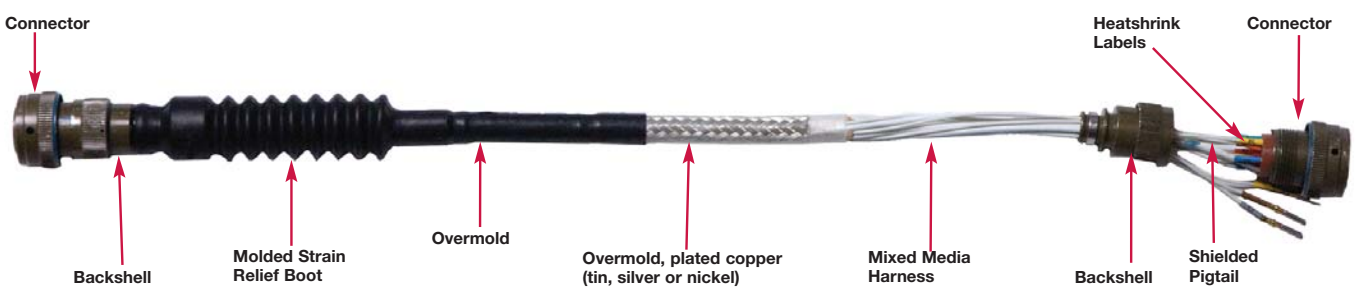
System integration is key to success in the global arena. Our expertise in connectors, cables, termination and shielding techniques and advanced testing ensures the performance of all these components in today's demanding program applications.

Cooper Interconnect can design a cable assembly or wire harness for almost any application.

- Military/Aerospace Cable Assemblies
- Space-rated Cable Assemblies
- Tow Cables
- Aircraft Ground Power
- Fiber Optic
- Weapons Systems
- Undersea Cables
- Power Cables
- Medical Cable Assemblies
- Meter Monitoring Assemblies
- Mixed Media/Hybrid
- Military/Ground Vehicles

From the deep-sea depths of the ocean to the farthest reaches of space, Cooper Interconnect is your choice to meet the toughest interconnect challenges.

Anatomy of Copper Cable Assembly



Our long-term involvement with the development phases of major systems and programs has driven Cooper Interconnect to employ the latest technology and equipment into its production capabilities.

To meet your needs, Cooper Interconnect's production capabilities include the following:

- Harnesses over 200 feet long and over 2,500 wires.
- Lacing per NASA-STD-87394.
- Planetary Cabling
  provides contrahelically-laid cables for maximum flexiblity.
- In-line taping and braiding for multiple shielding applications

Cabling and Wiring Applications

Cooper Interconnect has over 50 years experience designing and manufacturing cables assemblies and wire harnesses to the most exacting specifications. Using specialized components, we can provide improved performance and protection against damage, breakage and performance-limiting conditions. Such harsh environments include the following:

- Extreme high/low temperatures
- Vibration
- Corrosive conditions
- Electromagnetic Interference (EMI)
- Pressures to 20,000 PSI
- Shock
- Radiation
- Vacuum
- Radio Frequency Interference (RFI)

Mil-Aero Cable Harness Capabilities

Harnesses can incorporate both military-circular connectors and rectangular connectors to accommodate internal and external wiring for data acquisition systems. Harnesses can include up to 2,800 wires, be over 200 feet long and String-tied per NASA-STD-8739.4

Specialty Cable Assembly Capabilities

Innovation to match harsh environments and ensure operability are where Cooper Interconnect's expertise is at its best. We have manufactured hybrid cable assemblies that include multi-legged composite cables consisting of power, signal and fiber optics in a single cable. In addition, we produce cable assemblies to withstand the hazards of Hypergolic fuel residue and reside in aircraft fuel tanks. Using assemblies molded with Hypalon and jacketed with modified polyethylene material ensured these cables worked safely and as designed for years.

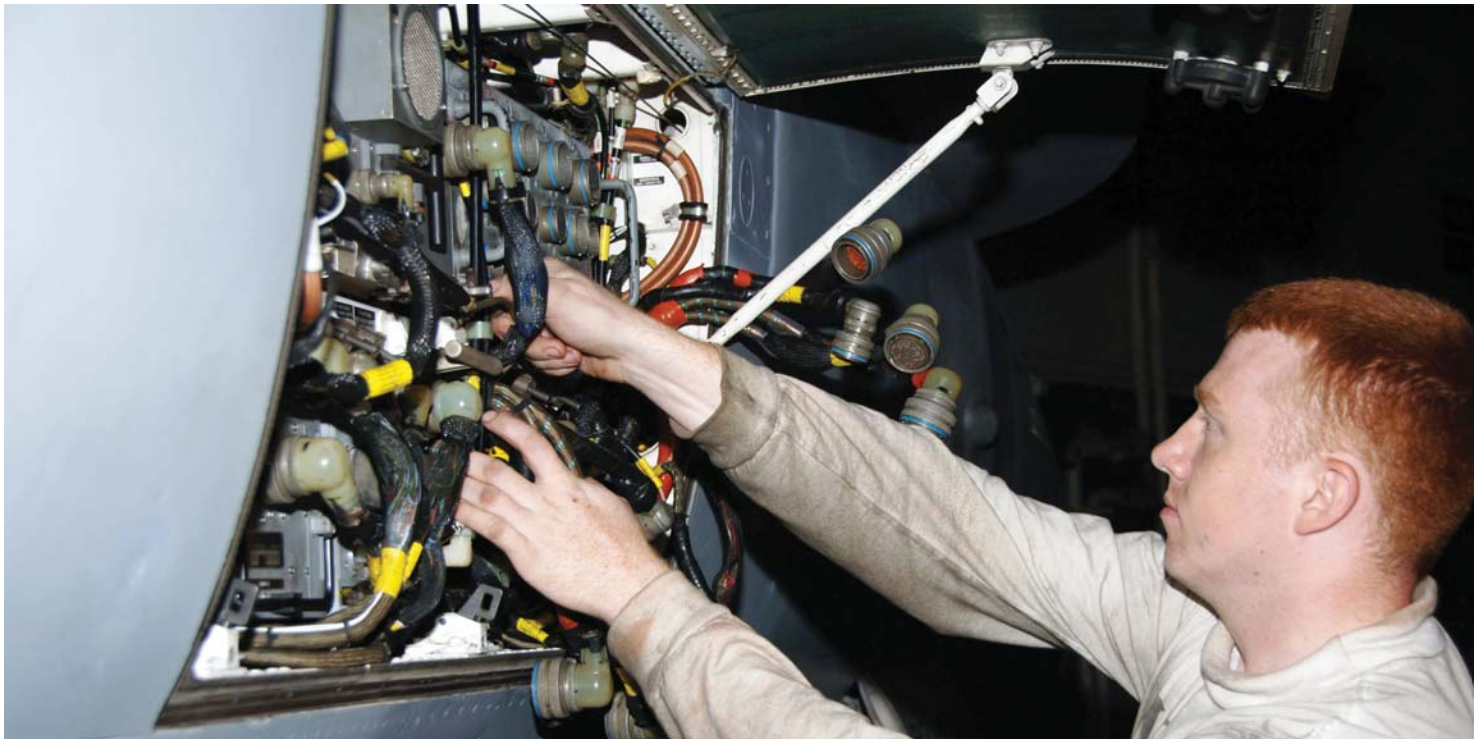
Space Cable Assembly Capabilities
Cooper Interconnect's specialized capabilities provide harnesses with over-braided and white nomex installed inside backpacks for astronauts, used on space missions. All of our assemblies meet stringent testing requirements, such as air exclusion soldering, impedance testing, vibration and thermal shock testing.

Subsea Cable Assembly Capabilities
Complete connector and cable assemblies for high sonar systems and hull-mounted sonar arrays. Lanyard-released connectors and umbilical cable assemblies for torpedo tube launched missile systems. Cooper Interconnect provided the design and production for all these applications, including hermetic connectors and headers for harsh environments, including undersea applications to 10,000 PSI.

Fiber Optic Cable Assembly Capabilities
Cooper Interconnect provides custom-engineered solutions for advanced fiber optic cable assemblies to support the most critical applications. We design and manufacture assemblies with specialized components that provide improved performance and protection against damage, breakage, and even life-limiting conditions. Each component is carefully selected, tested and certified to strict tolerances and rigorous specifications to ensure excellent performance, durability, and longevity in the field.

Harsh environment applications include conditions in which these products are exposed to extreme high/low temperatures, shock, vibration, radiation, corrosive conditions, high electromagnetic interference (EMI) and pressure extremes.

Cabling/Wiring Capabilities



Cooper's highly-trained and qualified staff are with you from initial requirements through final delivery and field service.

The engineering and process control associated with the termination of the shield onto the back shells has resulted in superior performance and reliability.

Benefits of Cooper Interconnect's cabling processes include the following:

- Insulation over cable including neoprene, EPDM, urethane and heat shrink materials.
- Insulated wires are purchased to MIL-Specs including Teflon, PVC, and other insulating materials.
- Insulation characteristics are tested via various tests including Hi-Pot and insulation resistance.
- Insulation requirements are determined based on the environment and the electrical characteristics required by the application of the final assembly.

Cooper Interconnect routinely over-braids cables and harnesses. We manufacture cable assemblies with foil and braid shields using in-house specially designed equipment. We altered these braiders to allow for precision braiding of harness assemblies through the calculation of braid angles and gear ratios to apply an optimized braid.

Our engineering team tightly controls the processes and set-ups of the machines to ensure good EMI protection.

Benefits of Cooper Interconnect shielding process:

- Supreme EMI/RFI protection.
- Rugged/harsh environment performance.
- Continuous connector-to-connector shielding.

Cooper Interconnect has developed a unique method for backshell and shield termination on molded cable assemblies that has been used in harsh environments and military appliations for over 20 years.

A copper plated, aluminum coated backshell is applied to the back of the connector forming a tight fit with minimum electrical resistance across the termination. Braided shielding from the cable is applied over the backshell and terminated by means of a stainless steel band applied at 50,000 PSI. This stainless steel band causes the braid to penetrate the copper plating, providing a superior electrical connection. Finally the braid is soldered to the braid shielding 360 degrees around the cable. This method consistently produces less than 1 milliohm resistance from the braid to the connector.

Molding

One of Cooper Interconnect's strengths is overmolding assemblies. We use many different materials to achieve the ultimate in performance, including:

- PVC
- Teflon
- Silicon
- Viton
- Polyurethane
- Neoprene
- Hypalon
- Epoxies

Cooper Interconnect has extensive experience and capability with EPDM (Ethylene Propylene Diene M-class rubber) – used in battlefield applications where NBC (Nuclear, Biological, Chemical) decontamination is required due to its small pore size and resistance to cleaning chemicals used for decontamination.

Molded assemblies are beneficial for environmental sealing and to protect wires during mechanical manipulation and bending. To achieve these high-operating standards, Cooper uses the latest molding equipment and complex in-house designed tools, and testing equipment to ensure the final assembly meets all requirements.

In addition, Cooper Interconnect has cable marking abilities according to the application. Nomenclature is inscribed into impression molds and ink-filled to present the appropriate information. We routinely perform automatic marking on heat-shrink materials and applied directly to cables. Heat transfer inks are used to permanently mark cables where required, and metal markers are purchased and attached to cable if needed.

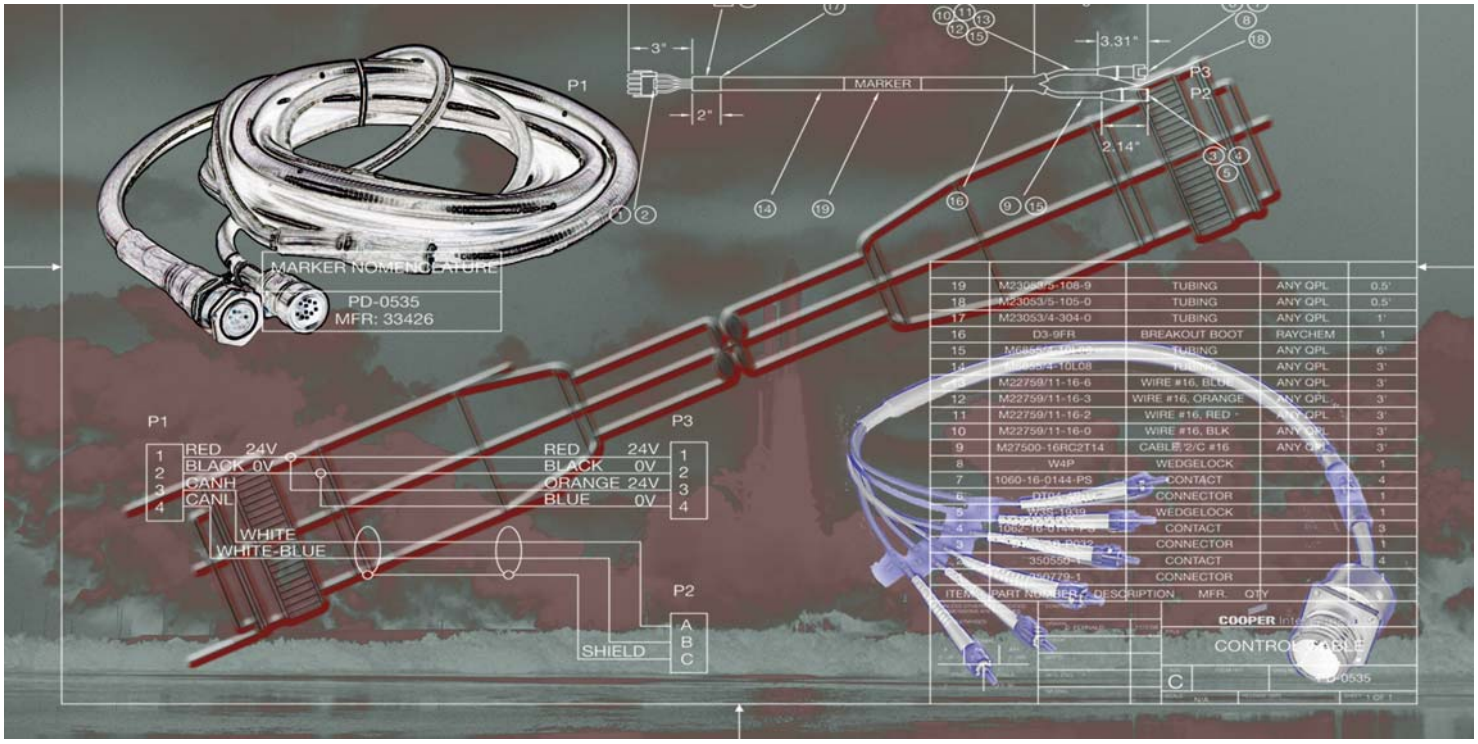
Our molding technique used in conjunction with the unique shielding termination allows for connector repair in the field if necessary. The molding can be removed, the connector repaired and the backshell overmolded again without damage to internal wiring.

Cooper Interconnect stands behind its products 100 percent and offers in-house testing services for most operating conditions, including flexibility, electronic signal integrity, flammability and safety. Within our lab facilities we can analyze the physical, mechanical and electrical attributes of your assembly. Cable assemblies and harnesses are tested using automated testing equipment (DITMCO machine) to test continuity, hi-pot and insulation resistance.

Some of the testing standards include

- High-frequency testing to 25 GHz
- Environmental testing for high/low temperatures
- Vibration and shock testing
- Salt fog, humidity
- Thermal cycling
- Hydrostatic testing (up to 10,000 PSI)
- Insulation resistance testing
- Hi-pot testing
- TDR (Time Domain Reflectometry)
- Fiber loss and interferometry
- Insertion loss and VSWR

Engineering and Quality



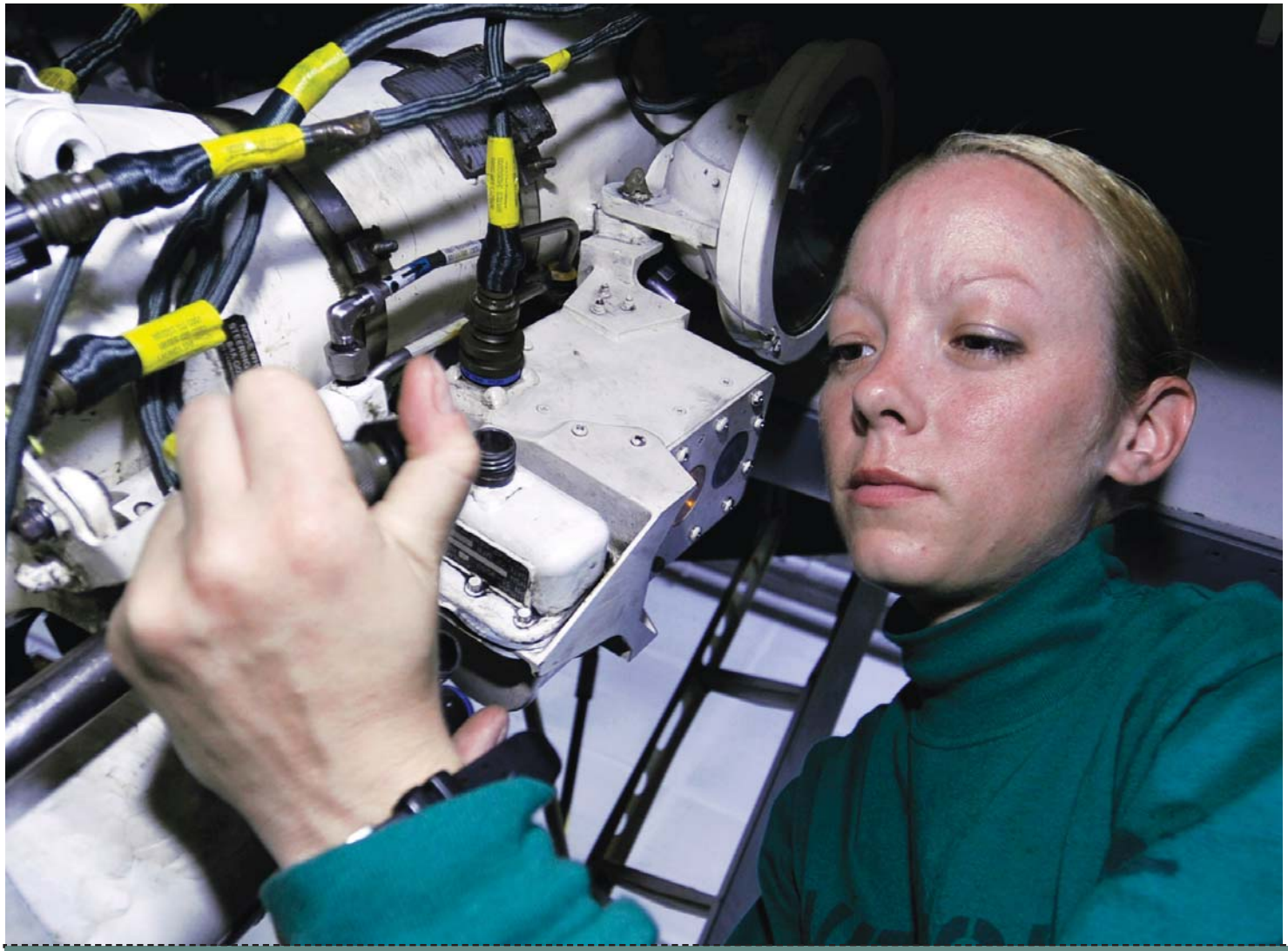
Cooper Interconnect believes innovation is key to developing a successful cable assembly solution. Our highly skilled engineers use the latest CAD, SolidWorks and Pro-E software and work with you to develop a design that can be made and tested against the harshest standards, whether on the battlefield or the factory floor.

We continue to work with you to help select components that will provide a *best fit* and *best cost* solution for your application.

Cooper Interconnect operates under various military specifications, quality systems, meets several qualified parts listing and specifications as set by Underwriters Laboratories (UL). Cooper Interconnect is certified to ISO:9002-9002 Quality System at most of its locations, and certified to Boeing's D1-9000 quality standard. In addition, Cooper Interconnect is fully ITAR registered and compliant.

We use the principles of Lean Manufacturing and Kaizen to ensure our assemblies are built and designed with the highest quality standards at the most economical price. We make continuous refinements and investments to stay abreast of the most advanced testing and inspection technologies.

COOPER Interconnect



Pocket with Business Card Slits

Solutions You Can Trust
In The Most Challenging Conditions

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